AN ENGINEERING STUDY

OF ROAD AND STREET NEEDS

BY THE MUNICIPALITIES OF ONTARIO

AND THE DEPARTMENT OF HIGHWAYS

ONTARIO'S ROADS AND STREETS

A Report to the Government of Ontario

Prepared by the Department of Highways, Toronto, Ontario, December 1958

ONTARIO
OFFICE OF
DEPUTY MINISTER OF HIGHWAYS

Toronto, February 5th, 1959.

Hon. F. M. Cass, Q. C.
Minister of Highways,
Parliament Buildings,
TORONTO, Ontario.

Dear Mr. Cass:

Transmitted herewith is an engineering report, prepared by the Planning and Design Branch on the road and street needs of Ontario.

An earlier report, "A Plan for Ontario Highways", which was presented in March, 1957, outlined the future development of the Provincial Highway system. That report has been valuable in Department operations and in planning for the future. It referred to the need for study in municipal areas. Accordingly, another study was commissioned which included all municipal roads and streets and also re-appraised the King's Highways and secondary highways. In the present report we submit the results of this study.

This report outlines our many road and street problems and the measures needed to deal with them. More detailed analyses are required to determine specific policies and projects for individual problems. The present report should provide a sound basis for such future studies.

Unprecedented cooperation between Department engineers and those of the urban and rural municipalities of the Province has made this project possible. We are also indebted for the assistance of certain private agencies and particularly the Automotive Safety Foundation of Washington, D. C.

I believe that the future will prove this study to be a significant milestone in the continuing work of the Department of Highways in planning better roads and streets for the citizens of Ontario.

Sincerely yours,

W. J. Fulton

W. J. Fulton,
Deputy Minister.

MINISTER OF HIGHWAYS
ONTARIO

Toronto, February 5th, 1959.

Hon. L. M. Frost, Q. C.
Prime Minister of Ontario,
Parliament Buildings,
TORONTO, Ontario.

My Dear Mr. Frost:

I am pleased to present an engineering report on the results of two years work, by the road and street agencies of Ontario, in analysing problems of the Municipalities and the Province.

For the first time, a complete analysis has been made of highway, road, and street needs in the Province for the next 20 years. The costs are large but necessary for the healthy growth of our economy, which depends heavily on the safe and expeditious movement of people and goods. As has been said, "Good roads do not cost - they pay".

The report poses problems of fiscal, legislative, and administrative policy that are already being considered carefully. The report also points to the need for increasing cooperation between the Province and the municipalities. The study itself was accomplished only through the excellent assistance of the municipalities, and it provides a basis for continued and increased cooperative action. My thanks are extended to all participants.

I commend "Ontario's Roads and Streets" to the attention of all Members of the Ontario Legislature, to Municipal Authorities and to the citizens of this Province.

Sincerely yours,

F. M. Cass

F. M. Cass,
Minister of Highways.

more long waiting for the ships to pass and the bridge
lift—the $19 million Burlington Bay Skyway now speeds
ffic through an area where sometimes traffic was delayed
much as an hour or more. Four traffic interchanges and
her connections along the approaches to the Skyway further
pedite travel.

PRINCIPAL PARTICIPANTS IN THE STUDY

DEPARTMENT OF HIGHWAYS OF ONTARIO

Hon. F. M. Cass, Q.C., Minister
W. J. Fulton, Deputy Minister

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CONSULTING SERVICES

Automotive Safety Foundation, Washington, D.C.

CONTENTS

FOREWORD

ONTARIO, stretching for a thousand miles both east and west and north and south, is one of the continent's largest jurisdictions below the federal level.

The variety of soils, the long distances, the influence of the Great Lakes and several large rivers and tens of thousands of lakes, and the many differing activities that make up Ontario's economy, all combine to confront Ontario citizens with complex, fascinating challenges.

Not the least of the challenges is provision of adequate transportation facilities. Ships and pipelines, railroads and airways, play an important role. But these are not enough.

Highways, in many cases better highways than we have today, are needed to link the vast reaches of our Province. They are needed to serve and encourage our economy. Materials, manpower and markets must be available readily and efficiently for a prosperous and progressive way of life.

It is no longer necessary to debate whether the motor vehicle is here to stay. The answer is seen in our routine living. Everyone is conscious of the growing number of motor vehicles and of the increasing dependence on them.

But of concern to all are answers to the following questions: Are Ontario highways, roads and streets adequate for to-day's traffic? What are the needs of to-day? Important too, what should we be doing now about the certain traffic increases of the future? How can we solve the baffling traffic tangles of our cities? And finally, what determines the necessary policies for our highway jurisdictions best to meet these problems?

The purpose of this engineering study is to help answer those questions.

Ontario has 83,800 miles of streets, township and county roads, secondary highways, and King's Highways. This extensive mileage is built and maintained by many jurisdictions, yet it is actually a single system, an inter-connected network — the Ontario highway system. The highway user cares little about who builds the roads; his chief desire is that the roads he travels on be of a high quality.

But the building and care of highways and streets are not simple jobs. New facilities and maintenance in 1957 entailed a total expenditure of some $276,000,000, and employment of about 20,000 persons.

A comprehensive study of all roads and streets was authorized two years ago by the Minister of Highways. The project was a cooperative effort of cities, towns, counties and the Ontario Department of Highways, with important attention given to townships. The Automotive Safety Foundation, a non-profit research organization of Washington, D.C., provided consulting services throughout the study. Valuable advice and assistance also was obtained from the Dominion Bureau of Statistics and the Automotive Transport Association.

The study is supplementary to one published in early 1957 entitled, "A Plan for Ontario Highways." That report covered needs on the King's Highways and secondary highways, the principal findings of which have been re-appraised, condensed and carried forward in this all-inclusive study.

The initial study has been extremely useful to the Ontario Department of Highways and will function as a guide for many years. As stated in that report, the Department regards highway studies as a continuing process. That belief is reflected in this new study which may be considered as a second stage in carrying on the Department's desire to keep planning current.

This second report, covering all parts of the Ontario highway network, for the first time brings to citizens a clear factual picture of total needs and suggests actions to meet them. The factual information sets the stage for systematic long-range planning for all jurisdictions and for improvement of fiscal and legislative policies.

It is hoped that the resulting facts about the entire Ontario highway network will enlist public support and understanding.

SUMMARY

Today the Province's population is about 50 percent more, and the number of motor vehicles and total highway travel is about three times larger than 20 years ago.

There is every reason to believe that the pattern will continue. In the next two decades, Ontario's population is expected to rise to 8.8 million and motor vehicles to 4.3 million. The outcome will be an almost incredible 40 billion miles of travel per year—2½ times that of today.

Those factors, and the dependence of the Province's economy on highway transportation, combine to demand a first-class Province-wide highway and street network. Since this study covers the needs existing now, plus those to occur in the next 20 years, the grand total cost is huge, approximately $7.2 billion. This is not, however, an unreasonable figure to anticipate, for, during the 20 years the average road cost per vehicle mile of travel, about 1.2 cents, probably will be a little less than during the last 10 years. The cost per capita would be about the same as spent in 1957.

A COMPLEX PROBLEM

More and more traffic is pouring onto all parts of the highway and street systems. Many miles demand more lanes and greater strength because of the volumes carried and the growing numbers of heavy truck transports.

In the past the highway jurisdictions, numbering 1,187, have faced challenging tasks, yet they have constructed and maintained the 83,800 miles of highway and street systems that have served the public well. But the accumulation of facilities needed today, and the certain large needs of the future, require closer cooperation of all highway, road and street authorities and improved administrative, financing and planning procedure.

NEEDS OF THE SYSTEM

Ontario's network of highways and streets falls into four jurisdictional groups: urban centres, counties, townships and the Province. For each group suitable design standards and uniform procedures were set by engineers and public officials concerned.

In the following discussion two kinds of costs are involved as described in Chapter VI: a) capital construction costs, and b) maintenance and administration costs. The former include not only costs required for basic improvements, but those for remedial work to preserve the investment and "stop-gap" construction to defer temporarily major improvements for which funds are not immediately available. All costs are based on 1957 prices.

URBAN STREETS

The rapid growth of urban centres and the increased travel internally and externally have swollen the need for capital street improvements.

Urban streets carry 40 percent of all traffic within the Province yet those streets constitute only 12 percent of the total mileage.

Needs were studied on 9,823 miles of streets in 345 urban centres which have primary jurisdiction over the streets, including routes connecting with the King's Highways. Capital construction needed totals $2.2 billion over the next 20 years.

Nearly two-thirds of the cost is for the high-volume arteries,—the King's Highway urban extensions, expressways and arterial streets. The 59-mile expressway system developed by Metropolitan Toronto, which has about half of all urban traffic in Ontario, was made a part of the study. Expressways projected for Metropolitan Toronto, Hamilton, Ottawa and London total 96 miles, at a cost of nearly $500 million, but their construction would be of immeasurable value to the livability and economy of these cities.

The need for action on the high-volume streets is illustrated by the fact that of the total capital costs $556,000,000 is for improvements needed now. An almost equal amount will be required in the next 10 years to keep abreast of needs.

Local streets also pose the double problem of catching up with postponed work and of meeting on-coming needs. More than a fourth are unpaved and less than half are of high type surface.

Maintenance and administration costs for all urban streets for the 20 years amount to $585 million, making the total street cost $2.8 billion.

COUNTY ROADS

County roads, under the jurisdiction of 37 counties, serve as the main arterials within the counties, along with the King's Highways. Averaging about 500 vehicles per day, the 9,200 miles of county roads handle about 11 percent of all traffic.

Capital investment needed on county roads during the next 20 years totals $456 million. Backlog of work needed now is estimated at $95 million. Some 1,500 miles of road are deficient now and a third of the bridges need replacement. Within 20 years, as roads wear out and new needs occur, nearly all county roads and two-thirds of the bridges should be improved or replaced. By 1977 the present 4,919 miles of pavement should be increased to 8,816 miles.

To the capital investment cost must be added $275 million for maintenance and administration, making the 20-year total $732 million.

TOWNSHIP ROADS

Although township roads average only about 50 vehicles a day, the mileage is so great that they carry about one billion vehicles miles of travel yearly. These roads are indispensable to the widely dispersed population they serve, and to others for access to recreation areas and movement of farm produce, lumber and other products.

The local roads are under the jurisdiction of 573 townships, and in some cases statute labour boards and improvement districts. They total 53,400 miles, 63 percent of all roads and streets, plus a small mileage included in urban street studies. Needs are simple, but combined they are extensive.

General deficiencies are inadequate road surfaces, uncorrected soil and drainage conditions and narrow bridges and culverts. Conditions on many roads make snow removal difficult.

Capital construction costs for the next 20 years are estimated at $703 million and maintenance and administration at $451 million, making a total of $1.15 billion.

PROVINCIAL HIGHWAYS

King's Highways, the Province's major rural routes, carry about the same amount of traffic as urban streets. The limited mileage of 9,000, about 11 percent of all roads and streets, connects with all other systems and transports nearly all through traffic and heavy trucks.

The 2,400 miles of secondary highways are administered by the Department of Highways because they serve areas, mostly in the north, which do not have county road systems. They are similar in function to southern county roads but usually do not carry as much traffic.

In 1956 the Department completed a detailed analysis of King's Highways and of secondary highways. That study has been of great value in planning and developing programs.

This new study re-appraising needs became desirable because of advances in rural and urban planning, new data and changed prices.

In the last two years capital expenditures of the Department have reached new highs in the effort to reduce the backlog on the King's Highways and secondaries. Present and future needs, however, remain large. Construction is estimated at $1.5 billion for the 20 years, somewhat less than in the previous study. Maintenance and administration would require $916 million, bringing the total cost to about $2.4 billion for these rural routes.

In addition to two-lane roads, proposed work includes bringing the present 394 miles of multi-lane highways up to 1,730 miles. Of these, some 1,300 miles would be controlled-access freeways.

Backlog construction needed now totals $476 million on some 2,600 miles of King's Highways and 2,000 miles of secondary highways. Included are 939 bridges and railroad grade separations.

THE TOTAL HIGHWAY PROBLEM

With advance knowledge of the size and character of the highway problem, the Province and its municipalities have opportunity as never before to utilize their resources, planning and actions to the best advantage. Part of the total problem are major administrative and legislative matters which affect rates of progress, intergovernmental relationships and planning, as well as financial considerations.

COSTS

The following tables summarize the broad classes of work involved and the costs for each of the systems.

20-YEAR NEEDS OF ALL ROADS AND STREETS

Backlog construction	$1,127,515,000
Future construction and stop-gap work	3,798,623,000
Maintenance and administration	2,226,782,000
Total	$7,152,920,000

TOTAL 20-YEAR COSTS BY SYSTEMS

		Percent of Total
Urban streets	$2,828,040,000	40
County roads	731,760,000	10
Township roads	1,154,340,000	16
Provincial highways	2,438,780,000	34
Total	$7,152,920,000	100

Confronted is a huge outlay which, if the needs are to be met, must be spread in some manner over the 20-year period.

In determinations of programs, several major factors must be considered. One is the magnitude of the total backlog. Another is the large volume of needs to occur within the next decade. These two combined amount to two-thirds of all road and street construction for the next 20 years. Still another factor is the size of urban needs, particularly urgent on King's Highway extensions and on expressways.

Meeting the needs may be accomplished in a variety of ways, as described in Chapter VI. One approach would be a gradual build-up over 20 years by adding some $7.8 million each year over the preceding year, above the $276 million expended for all roads and streets by the Province and the municipalities in 1957.

The ability of the municipalities to finance their shares, as well as the ability of the Province to assist, will dictate variable rates of improvement for different systems. On any program to catch up with traffic needs in less than 20 years more funds would be required sooner. However, this poses fiscal problems since it is in later years that the Province's growing economy would provide greater revenues. Nevertheless, postponements of needed construction would prolong the aggravations and hazards of inadequate facilities and hamper economic growth.

POLICY CONSIDERATIONS

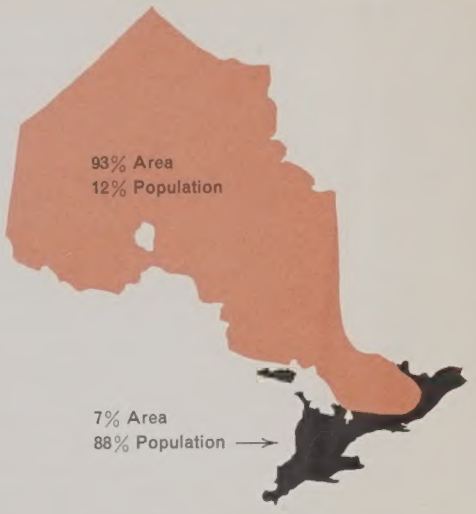
Because of the importance of Provincial subsidies in road and street development and the new challenges that arise because of the huge job ahead, the need for re-examining subsidies is apparent. The Department of Highways has recognized this, and a study is now under way.

More effective intergovernmental relations, extending beyond fiscal matters, also is a step in which progress is being made.

In the planning field two kinds are involved. One is development or basic planning which is concerned with the adequacy of the systems, the consistency of the routes within each system and placement of financial responsibility. The other is physical planning which requires adequate engineering staffs, modern construction standards and methods and timely production of designs and programs. Both are intertwined. Uncertainties in future finances and in jurisdictional responsibilities have hindered physical planning in the past. In turn, the lag in detailed planning of improvements has tended to retard construction.

In both fields of planning, as described in Chapter VI, re-examination of present situations and practices would lead to changes, which at relatively little cost, would enable the Province and the municipalities to coordinate their plans more closely, place financing on as sound a basis as possible, and expedite improvement programs.

In the process of making this study on the roads and streets of Ontario, the participants have learned a great deal about the procedures and methods used and the complexities and scope of the highway problem, and they better understand the need for close cooperation of all governments. They foresee the beginning of new programs and policies that will lead to a better highway transportation system as required by the growing Ontario economy.



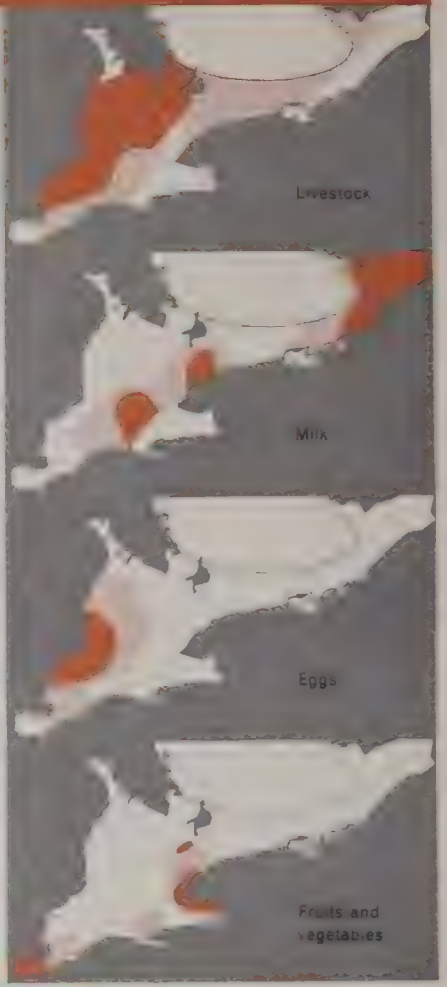
Pictured are just a few activities dependent on good highways —travel to recreation areas, transporting school children, hauling ore, travel to an industrial plant, and operation of a truck terminal and a farmer's market.

ECONOMIC ACTIVITIES GENERATE HIGHWAY NEEDS

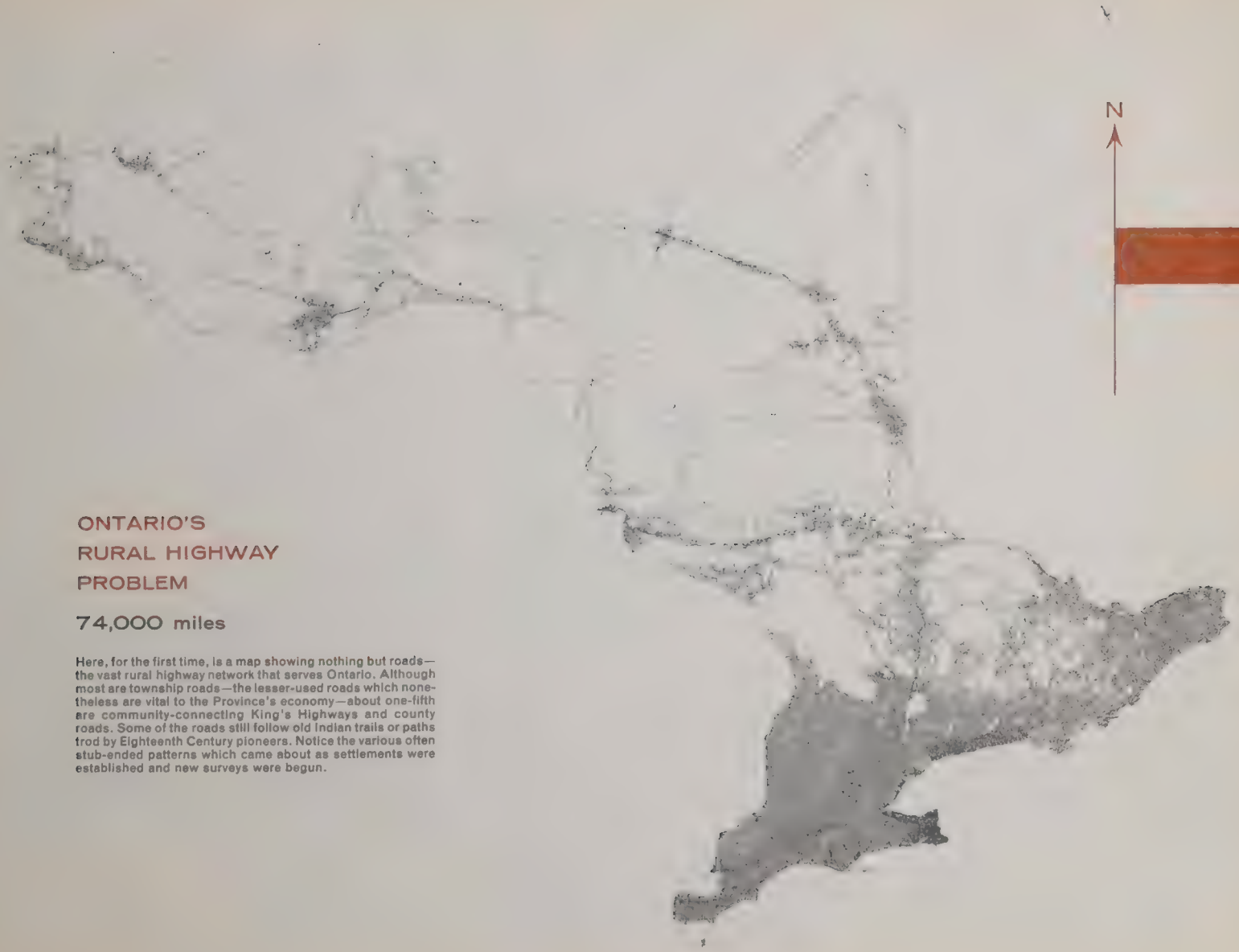
Ontario's rapidly growing population and economy is putting more and more pressure on the Province's network of highways and streets. Here are pertinent facts which serve as a background to analysis of highway needs and programs.

- For many years Ontario has had one-third or more of Canada's population and labour force.
- Ontario's population rate of growth in recent years has exceeded the average Canadian rate and has been nearly double that of the United States.
- Probably Ontario's population within 20 years will increase by 3 million people to some 8.8 million.
- To-day nearly three-fourths of Ontario people live in urban areas, and the trend continues towards the large communities.
- Ontario has 43 urban centres of more than 10,000 people containing over 60 percent of Ontario's population, with Metropolitan Toronto accounting for one-fourth of the total.
- Factory production in Ontario, which makes up over one half of Canada's total, has almost tripled in value since the end of World War II.
- Canada's gross national product in 1953 was $25 billion—of that, 22 percent was related to motor transportation.
- The volume of freight carried by motor vehicles in Ontario is much greater than the freight carried by all other forms of transportation combined.
- Volume of freight carried by motor vehicles has increased by about 50 percent since the Second World War while freight volumes on other major forms of transport have not increased.
- Two-thirds of the communities in Ontario are served solely by motor transport.
- Over 90 percent of all Ontario food products shipped into Toronto travel by truck.
- Annually, a quarter of a billion dollars or more of business comes from tourists.
- Ontario traffic patterns and needs are shaped by:
  Increasing industrial and agricultural output;
  Development of natural resources;
  Growth of suburban residential areas and shopping centres.

Improved highways—eliminating sharp curves, narrow bridges, rough pavement, traffic congestion and other hazards—would reduce accidents and car driving costs, and facilitate the economic development of Ontario.



Agricultural production areas, as indicated by brown, cover much of Southern Ontario. The solid color shows areas of greatest productivity. Nearly all production is transported by truck.



ONTARIO'S RURAL HIGHWAY PROBLEM

74,000 miles

Here, for the first time, is a map showing nothing but roads—the vast rural highway network that serves Ontario. Although most are township roads—the lesser-used roads which nonetheless are vital to the Province's economy—about one-fifth are community-connecting King's Highways and county roads. Some of the roads still follow old Indian trails or paths trod by Eighteenth Century pioneers. Notice the various often stub-ended patterns which came about as settlements were established and new surveys were begun.

CHAPTER ONE

Today the roads and streets of Ontario are serving greater and heavier traffic volumes than ever before. To meet the great increases in demands for more and better highways, the various public authorities have endeavored constantly to improve cooperation, finances, organizations and methods.

Where we stand today in relation to the past is the key for predicting the future. This study views the past and forecasts the future ownership and operation of motor vehicles. The findings should enable government jurisdictions to determine better their responsibilities and courses of action in confronting the expected huge growth in highway transportation.

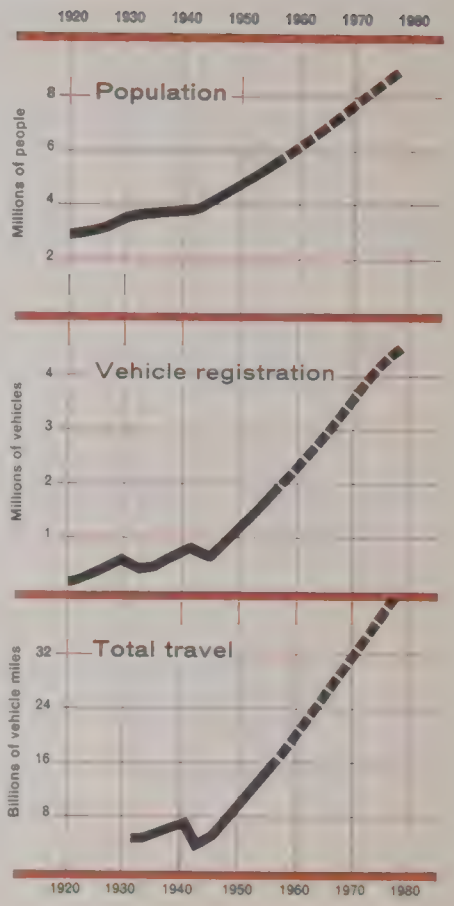
In 1957, the 1,805,000 motor vehicles owned in Ontario collectively travelled every day nearly half the distance to the sun—some 45 million miles, or about 16 billion miles a year.

That striking total is more than double the figure of 10 years ago.

The speed and ease of communications and the interchange of people and goods encourages and permits rapid growth, which, in turn, brings about need for faster and better transportation.

FUTURE GROWTH

As the accompanying charts show, careful studies of the long-term trends indicate the general nature of the load the road and street systems must carry. Roads are built now to serve for 20 years or more; planning must be far enough ahead of demand to reserve necessary land; and governments must plan their finances to build the right kinds of facilities when these are needed. So this needs study is based on an estimate of growth for the next 20 years.



The studies show that by 1977, Ontario can expect 2½ times the motor vehicle travel of 1957. This means that most locations would see about 2½ times the present traffic load. On a number of major highways and on numerous city streets, such volumes would not be possible because they are carrying their maximum load now. Expansion must be accomplished, and best use of the present facilities must be planned, with modernization for safer, quicker travel.

The prediction is conservative, for it is reasonably clear that there will be over 3.0 million more people in the Province by 1977. As they find places to live, work, shop and play, and as the real wealth of a productive economy grows, more motor vehicles will be needed to serve all the expected 8.8 million people of Ontario. In 1957, about one of every three men, women and children owned a car or truck, on the average. In 20 years, an average of one in two persons will have a vehicle—a ratio already being approached in many areas.

More people, owning more vehicles, are bound to push the total number of vehicles up to about 4.3 million by 1977, even with an annual rate of increase less than that of the last decade. Truck ownership and travel will continue to grow at a faster pace than for passenger cars, reaching 858,000 vehicles and 30 percent of all travel.

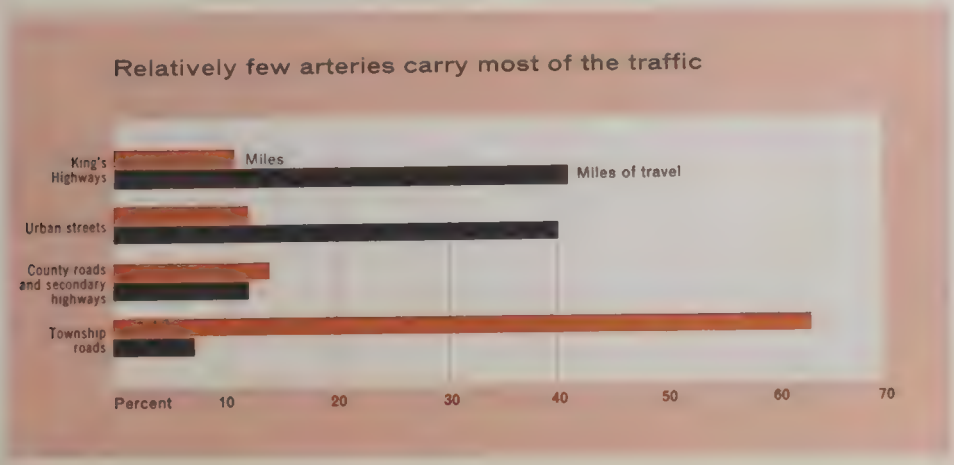
The certain growth of population, vehicles and travel will bring more highway problems but also will bring more revenues of all types to government treasuries. In order to conserve highway funds and to channel them where most needed in the future, this study has analyzed carefully the effects of the growth and changing character of traffic on all the different parts of Ontario's highway network.

SYSTEMS AND RESPONSIBILITIES

The people of Ontario are served by a vast network of 83,800 miles of highways, roads and streets. These arteries fall roughly into five groups, with responsibility for them assumed by various governmental jurisdictions. The groups vary widely in total length and total traffic, as shown by the table.

	Miles	*Percent of Miles*	*Percent of Travel*
Urban streets*	9,800	12	40
Township roads	53,400	63	7
County roads	9,200	11	11
Secondary highways	2,400	3	1
King's highways	9,000	11	41
Total	83,800	100	100

*Urban Street mileage includes some township and county road mileage which was studied as urban streets.



URBAN STREETS

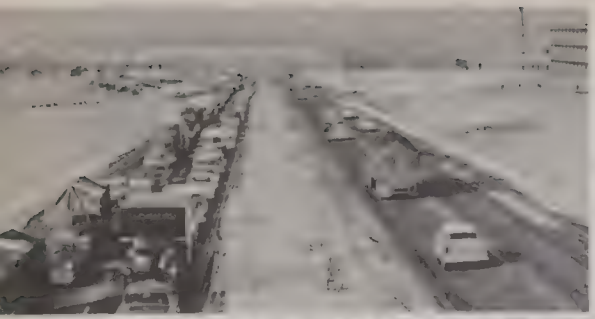
The 340 cities, towns and villages of Ontario, ranging in population from less than 1,000 to more than one million, have primary jurisdiction over urban streets, including nearly all King's Highway connecting routes. These urban communities contain 71 percent of Ontario's population. As shown by the table and the chart, the traffic facilities in these areas make up a small percentage of the total mileage in the Province, yet they serve over 6 billion vehicle miles annually, with about 50 percent of it in Metropolitan Toronto alone. Large outlays will be required to eliminate traffic delays and congestion and to keep heavy traffic volumes flowing smoothly and safely in these areas.

TOWNSHIP ROADS

Rural local roads, in contrast to urban streets, make up a large mileage which serves only a small part of total traffic, averaging about 50 vehicles daily. Of extreme importance to a widely dispersed portion of the population and to farms, recreational and other rural properties, local roads have relatively simple but extensive needs. Local roads are under the jurisdiction of the 573 townships which control an average of less than 100 miles each. In some cases local roads are improved through statute labour boards and improvement districts.

COUNTY ROADS

Rural arterial roads are under the jurisdiction of the 37 counties. They serve mainly as farm to market roads and connect otherwise isolated rural communities. County roads, having only 17 percent as many miles as the township roads which feed into them, carry materially more traffic per mile—about 500 vehicles daily, on the average. Certain roads adjacent to the cities and separated towns are under the control of Suburban Roads Commissions. Each Commission is made up of representatives from both the county and the urban centre.



It takes all kinds of roads to make a highway system, such as heavily travelled Highway No. 401 near Toronto, the local road essential to loggers near Kearney, and the local farm-to-market road near Westport which serves the vital activity of farming. And, insofar as possible, all highways must be kept in top condition and open the year round.

In two decades paved surfaces have increased from about 10 percent of the total to nearly 20 percent. Meanwhile total mileage has increased by nearly 4,500.

SECONDARY HIGHWAYS

Secondary highways are administered by the Provincial Government since they serve areas which do not have county road systems. These arterials, largely in northern parts of the Province, provide access to mining and forest-product communities as well as areas of new development. They are similar in function to the county roads in the southern areas, but generally do not carry as much traffic.

KING'S HIGHWAYS

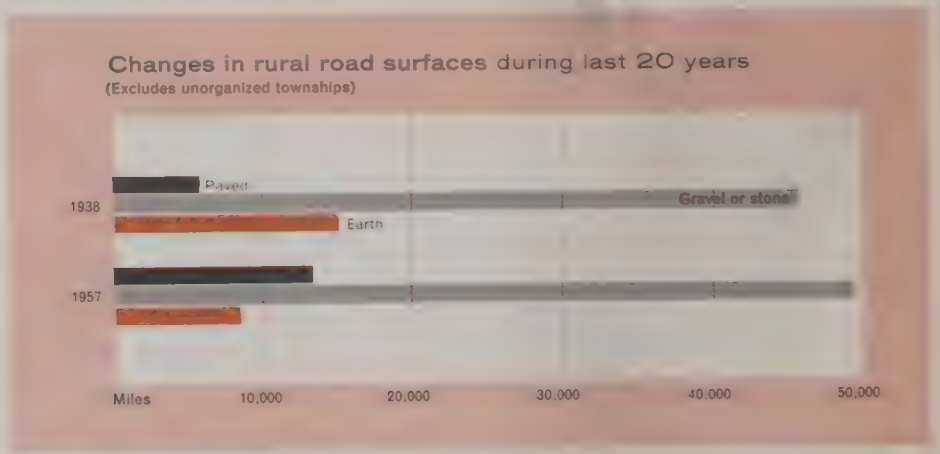
The King's Highways, composed of the Province's major routes, are controlled and financed wholly by the Department of Highways. The limited mileage of King's Highways, carrying 41 percent of total travel with traffic averaging 2,100 vehicles daily, is the backbone of the highway network. Not only do King's Highways connect with all other systems but they transport the bulk of through traffic and heavy trucks. These highways account for a substantial portion of expenditures.

TOTAL SYSTEM

The foregoing has described in brief terms the relative functions of the component parts of Ontario's road and street system, which is made up of local roads and streets, arterial roads and streets and main trunk or King's Highways. Each of these parts of the total system has an essential part to play in serving Ontario's motor vehicle transport industry, which is becoming increasingly important to the Province.

The significant relationship that these different highway components have to each other may be illustrated by the fact that most trips on the King's Highway commence and end on the other classes of roads and streets. A city dweller travelling to a resort property drives successively on local streets, arterial streets, King's Highways, and on the county and local roads serving the resort area. This is true in varying degrees for all motor vehicle trips.

It is apparent that a weakness in any component part of Ontario's road and street system is a weakness of the system as a whole. The value of an adequate King's Highway system is diminished considerably if the township, county road, and urban street system are not equally adequate. The value and productivity of different properties and resources is dependent upon the quality of road service provided; similarly, the efficient and fruitful development of Ontario's economic resources requires an adequate and well-administered total system.



FINANCE

Sharing the costs of highway construction and maintenance has been practiced in Ontario for many years. During the 1920's the costs of building the pioneer Provincial Highway system were borne 70.percent by the Province and 30 percent by cities and counties. Although the King's Highway system was established in 1930 it was not for five years that financing became a Provincial responsibility.

Soon the cost-sharing role became reversed. Initially, local jurisdictions had almost the sole responsibility for financing and constructing their own facilities, although small subsidies were granted by the Province as early as 1903. As highway traffic increased, and as local governments encountered difficulty in raising sufficient highway monies, the practice of providing substantial subsidies by the Province began. Over the years the subsidies became larger, as is illustrated by the accompanying chart which shows the amounts of subsidies and the total highway, road and street expenditures by all governments. The latter reached a new high of $276,000,000 in 1957.

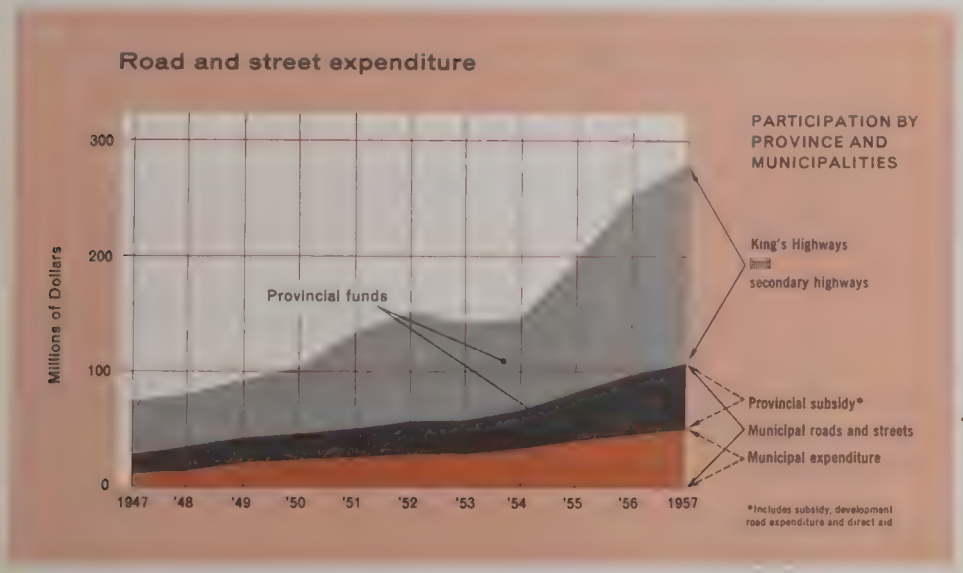
The greater expenditures reflect the larger volumes of construction and the higher design standards required to keep pace with the demands of highway users, as well as higher prices for labour, equipment and material.

Municipal subsidies provided by the Province totalled $4 million in 1937, but by 1957 they had increased thirteen-fold to $51.5 million, including amounts paid to urban municipalities beginning in 1947.

Although the totals have increased, on the average a 50-50 sharing basis has been maintained in recent years.

The accompanying table shows the percentage of local construction and maintenance expenditures subsidized by the Province. Remaining shares must be provided by municipalities through local taxes.

In order to merit subsidy, municipalities must carry out work in accordance with administrative and technical standards. To administer this large program of Provincial subsidies, engineers from the Municipal Roads Branch of the Department of Highways deal continually with the municipalities, providing advice and assistance.



PROVINCIAL SUBSIDY

	No.	*Roads* (percent)	*Bridges* (percent)
Cities	29	33⅓	33⅓
Separated towns	8	33⅓	33⅓
Metropolitan Toronto	1	50	50
Towns	149	50	80
Villages	154	50	80
Counties	37	50	80
Townships	573	50-80	80-100
Improvement districts	24	50-80	80
Suburban road commissions	33	50	80
Statute labour boards	179	50	80-100
Total	1,187		

Construction costs on King's Highways in towns of up to 5,000 population are shared between the Province and the municipality by means of various Connecting Link Agreements, while in large cities major construction costs are sometimes shared by means of a Construction Agreement between the Department and the municipality. Also, in rural areas the Province pays 100 percent of Development Road construction on certain local roads, by special agreement.

Contributions by the federal government have aided the Province in the construction of its 1,466-mile section of the Trans-Canada Highway, which will be completed within a few years.

CONCLUSION

The past has shown a record of enlightened adaptation of governmental relationships to changing economic and social conditions. The traffic increases and community expansion of recent years, as well as the anticipated future changes, have made it imperative that these relationships be reviewed in the light of current and future needs. If changes in administration and finance are necessary, an accurate picture of over-all road and street needs will help to determine the appropriate changes.

CHAPTER TWO

COOPERATIVE STUDY

Every responsible road and street authority has given attention over the years to planning, development and maintenance of facilities to the best of its ability. With the growing complexity and size of the traffic problems, coordinated action of all agencies becomes increasingly necessary. A major move forward in this continuing effort is the present comprehensive engineering analysis of the total problem and its principal parts.

A first step was to establish the status of all roads and streets and their ability to serve present and future traffic. Final objectives were to determine the nature, location and timing of needed improvements, their costs and maintenance requirements. All this was done on a reasonably uniform basis, consistent with traffic needs, in all areas and jurisdictions, to the end of developing a well balanced program. How this was accomplished is described in this chapter.

A study of such scope required the cooperation and active participation of the different road and street jurisdictions throughout the Province.

The mutually-conducted program took place on three levels.

Because of its province-wide interest and organization, the Department of Highways served as the coordinator

Municipal and local officials and engineers, through committees, reviewed standards and procedures

Local authorities carried out the actual review of their road and street needs, with aid from the Department where needed.

Through this cooperative effort each participating authority gained full knowledge of its own problems. Together, the survey results give a picture of the total needs of the Province. And finally, the study made clear that for the economic health of the Province there must be coordinated progressive development of all segments of the system—city, county, township and Provincial.

GENERAL PROCEDURE

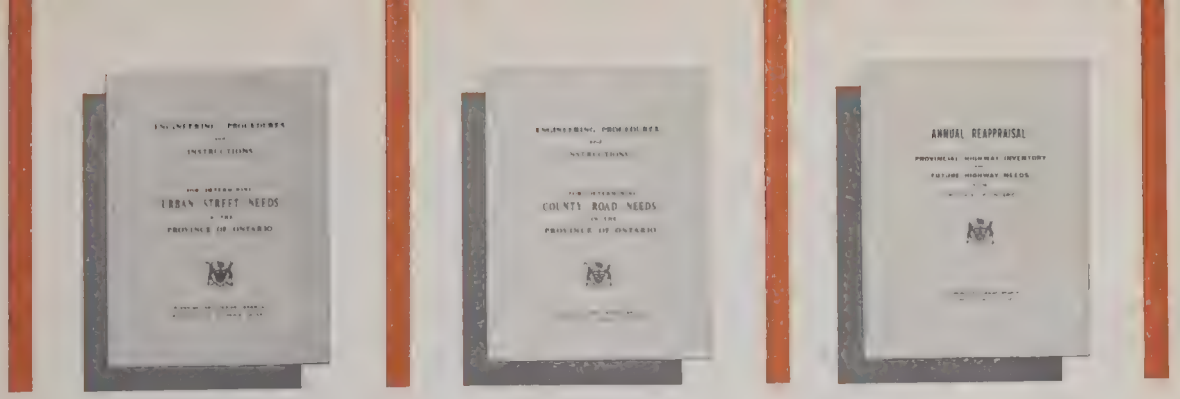
Ontario's roads and streets for study purposes were treated according to type of jurisdictions: streets under the control of cities and towns, roads under the counties and townships, and the roads and streets for which the Department of Highways is responsible.

While for each of the three types of jurisdiction a separate study group was set up, with somewhat differing procedures, the following steps were common to each:

1. Study of service characteristics and classification of roads and streets
2. Tabulation of all necessary information about the roads and streets, including structural characteristics and traffic volumes
3. Development of standards of design for each type of road and street and expected traffic
4. Projection of future traffic increases and demands
5. Analysis of present service deficiencies and determination of future improvements needed to take care of anticipated traffic
6. Estimate of cost of improvements over a 20-year period, with degrees of urgency indicated.

MAINTENANCE COSTS

All road and street systems require heavy expenditures for maintenance, including general repair, snow and ice control, traffic aids such as signs,



Manuals of procedures were developed to obtain complete information and uniformity for each class of highway.

Generally the main streets of small cities and towns are also the main routes for through traffic. This is Main Street, Brampton.

signals and markings, weed control and cleaning.

A seventh step—study of maintenance needs—was therefore carried out for each system. Costs of past performance were analyzed by the appropriate staff and committee. Consideration was given to the adequacy of past work. Estimates were prepared showing amounts, including equipment, required to do a proper job at 1957 prices of labor, equipment and materials.

Administrative and other operational costs were not analyzed in detail; reasonable estimates of such general overhead expenses have been established in the form of percentages of total needs. Available records show that the following values represent adequate allowances for these costs. These values are percentages of estimated total capital and maintenance costs:

King's Highways	6 percent
Secondary highways	5 percent
County roads	5 percent
Township roads	3 percent
Arterial streets	4 percent
Local streets	3 percent

CITIES AND TOWNS

A City Engineers Committee composed of officials and engineers experienced in urban street problems was formed to advise the Department throughout the study. It assisted the study staff in establishing procedures and in dealing with specific problems.

MAJOR STREET SYSTEMS of the 75 municipalities with populations of 5,000 or more were analyzed in relation to traffic circulation of the city as a whole. Main routes in other centres were analyzed separately. Local streets in all communities were reviewed on a mass appraisal basis. Major routes of urbanized townships were included in the study of adjacent cities.

Fundamental to problems of engineering analysis and legal and administrative control is the classification of streets. Based on the desirable operation of each street in the over-all transportation plan of the urban centre, the urban streets were separated into the three functional systems described in Chapter III.

Initially, a classification map was prepared by Departmental staff for each city and town, using aerial photographs and other material. Resulting plans were then discussed with local officials and agreed upon after necessary deletions or additions were made. Inventory data were then compiled by each municipality on all streets, including information on pavement width and type of construction, right-of-way, estimated remaining life, bridge details and protection at railway crossings. Peak hour vehicle volumes were measured at designated locations.

Discussions were held with local officials to determine traffic and structural deficiencies, when and

what type of improvements were needed, and costs involved. Participants agreed that class designations and improvements considered were for study purposes only and were not to be construed as binding on either the municipalities or the Department.

LOCAL STREETS were inventoried according to width and surface and for their adequacy to meet present service needs. In addition, estimates were prepared of the mileage of local subdivision streets that would be required during the study period. Assuming that the modernization and improvement of existing streets and the construction of new streets would occur gradually over the next 20 years, a single program was developed and costs were estimated by methods worked out with the City Engineers Committee.

The work sheet and design standards are reproduced in the Appendix.

COUNTIES AND TOWNSHIPS

As in the urban study, a County Engineers Committee was formed representing the various geographical and economic areas of the Province. Members of this committee reviewed the principles and methods of the survey and provided advice and guidance to the Department personnel conducting the study.

COUNTY ROADS

Engineering analysis was carried out in detail on all roads, bridges and railway crossings in the 37 counties. Each county engineer was requested to evaluate his own road system with assistance from the Department.

In each county, the engineer identified all road sections, bridges and railway crossings on the county map, to provide for easy review and reference. Road sections were selected on the basis of continuity, uniformity of physical characteristics and traffic volumes. Generally, traffic counts were supplied by the county, but in cases where this was not possible, counts were obtained by the Department. From these data, 1957 traffic volumes were calculated and 1977 volumes were estimated.

Each road section was then evaluated in terms of its adequacy to carry traffic, as well as for its structural condition. Deficiencies were determined and the type, time and cost of improvement to predetermined standards were estimated for all sections. All information was entered on county road work sheets (see Appendix). In addition, separate work sheets were used for all bridges and railway crossings. Certain county roads in suburban residential areas required a somewhat different approach in evaluation of their needs, and special work sheets were used, recognizing the more urban nature of such roads.

Two specific techniques not utilized in the urban study were employed in the study of county roads. Firstly, in addition to having design standards for new construction (see Appendix) a table of tolerable standards was drawn up. Secondly, a rating system was used in which a point score was allotted to the individual characteristics of each road section which, when totalled, provided a numerical estimate of deficiencies in relation to the standards. The point score indicated the degree of deficiency and the time improvement would be required.

Improvement costs were estimated by each county engineer, based on his previous work and knowledge. These costs were then reviewed by the staff and the County Engineers Committee, and some adjustments made to reflect more complete or more realistic requirements.

From the standpoint of mileage alone, even though their costs per mile are less than for other classes, county and township roads make up a large part of the highway problem.

TOWNSHIP ROADS

Because of the large number of townships, numbering almost 600, a statistical sample was set up to cope with the problem of obtaining the over-all township needs. The methods and procedures used were similar to those in the counties, with the exception that Departmental staff made the actual survey and estimates on the sample mileage. Results were expanded to give a reasonably accurate estimate of needs on all township roads, throughout the entire Province.

PROVINCIAL HIGHWAYS

A complete new survey and analysis of needs on the King's Highways and secondary highways also was made by the Department of Highways. Although a study of the King's Highway problem had been carried out two years previously, it was recognized that a re-analysis was essential for the following reasons:

- A large program of construction in the intervening two years had resulted in an over-all improvement
- During the same period some new deficiencies and problems had arisen
- Changing economic conditions had resulted in different costs of highway operations
- Experience and research in the field of planning surveys had resulted in revised techniques of analysis, particularly with regard to traffic congestion.

Applying procedures used in the original needs survey and in the concurrent study of urban and rural systems, King's Highway and secondary highway needs were determined by an inventory and analysis of existing conditions. This was related to tolerable service limits, and present and future deficiencies were identified. Next, the necessary improvement projects were determined to eliminate those deficiencies and to provide a highway system of acceptable engineering standards. Finally, costs of the necessary improvements were estimated according to existing price levels.

Field district personnel, following techniques and standards established by the Planning and Design Branch, reviewed the data, up-dated it, and helped re-estimate all requirements.

As a product of the 1956 needs survey, this procedure has become part of the routine working mechanism of the Department's activity. This work provides continuing background information for the planning analysis of all highways under the responsibility of the Department.

UNPRECEDENTED COOPERATION

This large-scale survey of needs of the entire provincial transportation system has been carried out in three areas: the routes controlled by the urban municipalities, the rural municipalities and the Provincial government. The work was performed on three levels under the leadership of the Department of Highways with the review of the engineering committees, and with the survey and study by each agency concerned. The operation resulted in an unprecedented degree of cooperation between the Provincial and municipal governments. The obvious advantages of such intergovernmental coordination have paved the way for future enterprise of this type on both a small and a large scale.

Another by-product of the survey, in addition to the valuable information provided, is the sound professional basis for studying and planning future facilities that was introduced to the various agencies and which undoubtedly will influence their future administration. The information provided by the survey and the conclusions reached from the analysis are recorded in the succeeding chapters.

As the main part of the Province's road and street network, the limited mileage of King's Highways poses a constant challenge in straightening, reconstruction, provision of new locations and making other improvements to keep up with traffic pressures.

CHAPTER THREE

The motor vehicle, through sheer numbers and the transformed travel habits brought about by it, has caused revolutionary changes in urban living and development.

In larger cities traffic flows go in all directions—most of it from all sections to the central business district, but large volumes move from residential sections to old or new industrial areas, and to suburban shopping areas as well as from suburb to suburb. And all the while urban centres are getting bigger, both in population and area, with continued dispersal of homes, shopping centres and industry.

The city traffic problem is two-fold. A constant problem, accounting for a large part of the cost, is to maintain and improve present streets. The other problem is to provide modern facilities to absorb heavy traffic volumes which today's street systems cannot handle efficiently and economically. Both problems must be solved in order to eliminate congestion, delay, and economic wastes which come from accidents, lost time, and excessive car operating and repair expenses.

Because cities have lost ground in the struggle to serve traffic, unfulfilled needs of the past are large. The expected growths in population and in motor vehicle use further increase the need for capital street improvements.

A primary step in cities of all sizes is the further application of modern traffic control devices and techniques to obtain the best service from existing and future facilities. But the inescapable remedy in the larger cities is provision of arteries capable of accommodating mass traffic flows. Such arteries include reconstructed and widened streets, new surface arterials and expressways.

During the next 20 years, as is detailed later, a total of $2.1 billion should be spent for street construction, reconstruction, resurfacing, bridges, grade separations and traffic control measures. That is a large figure, but so is the total traffic expectancy for that period—some 220 billion vehicle miles of travel.

THE SYSTEM

The engineering survey of needs in urban municipalities was made in 345 centres and on 9,823 miles of street. The mileage involved was 12 percent of the total Provincial road and street system and carried 40 percent of total traffic.

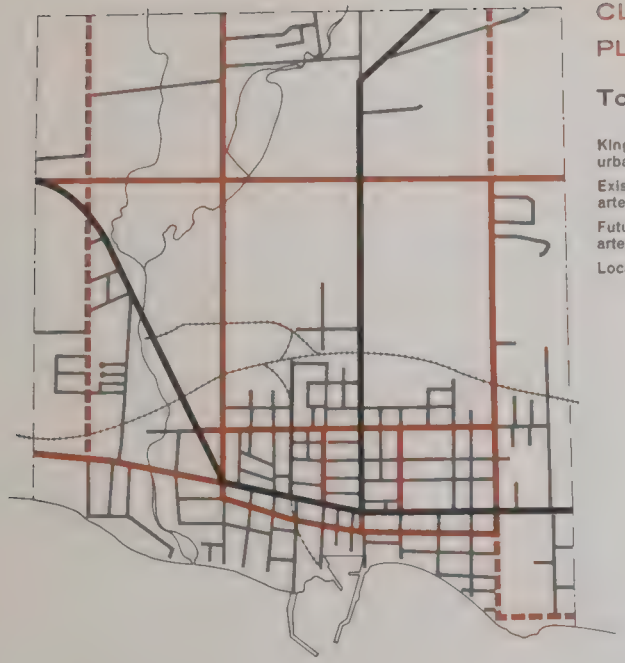
CLASSIFICATION

In each urban centre, existing streets were placed in three classes based on the desired function of each street to provide for an integrated traffic circulation plan. Classes selected were:

1. URBAN EXTENSIONS of the King's Highway system, totalling 790 miles; urban routes connecting with the rural King's Highways approaching or by-passing the urban centre
2. ARTERIAL STREETS, totalling 1,960 miles; urban routes, which along with the Urban Extensions, form the main traffic arteries within the urban centre
3. LOCAL STREETS, totalling 7,073 miles; streets used primarily for direct access to abutting properties, including streets serving business and industry.

In the four largest urban centres, expressway systems were developed. Costs for these facilities are listed separately.

An example of a classification plan is the map of Cobourg shown on page 20.



CLASSIFICATION PLAN

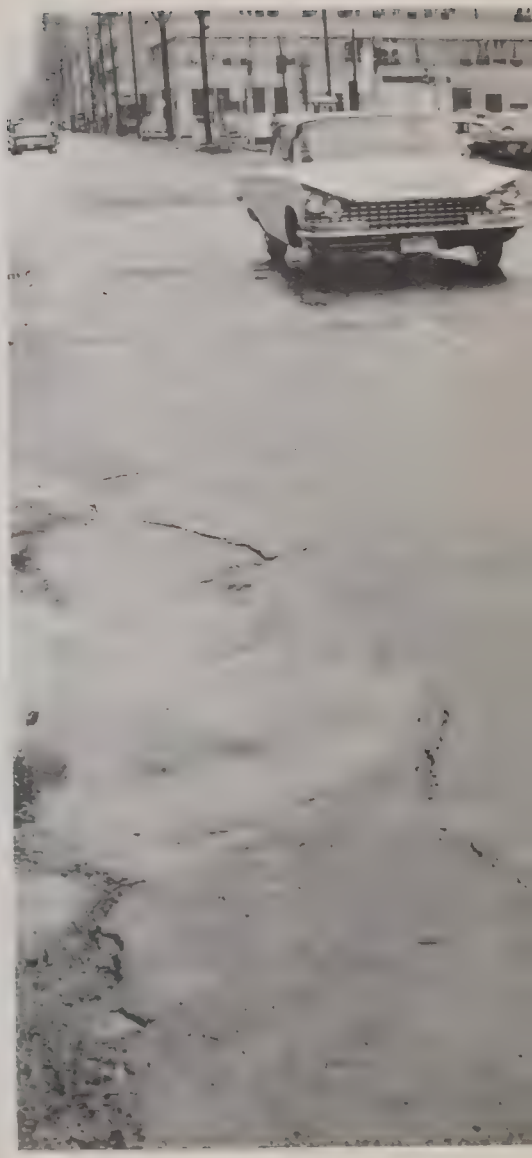
Town of Cobourg

King's Highway urban extensions

Existing arterial streets

Future arterial streets

Local streets



Local service streets compose more than 70 percent of the urban mileage. A third of the 20-year construction costs will be required to eliminate such deficiencies as typified by Richmond Street in Toronto. Also, large sums must be spent for maintenance.

APPRAISAL

In appraising each urban centre the fundamental step was to develop an integrated arterial system providing adequate traffic service to all focal points of the urban area. These streets were studied, firstly on their adequacy to serve the demands of estimated 1977 volumes, and secondly on their structural condition.

Where traffic congestion exists, or may occur, the remedies recommended were those which best fitted the traffic needs at the time the deficiency was estimated to be critical. In some cases recommendations were for prohibition of peak hour parking or widening the pavement to provide more traffic lanes. In other situations relief was proposed through the application of various forms of traffic control (one-way streets, intersection improvements, etc.) or by construction of new streets, by-passes or expressways. Where structural deficiencies were found, or were expected to occur, resurfacing or reconstruction was planned for at the required time.

The plan on page 21 shows the major improvements determined necessary in the City of Brantford, and is presented as an example of how urban problems can be met.

CAPITAL NEEDS

The estimated construction cost of all needed street improvements in the next 20 years is $2.1 billion. Additionally, costs for future capital replacement, temporary stop-gap construction, maintenance and administration must be included in the total program, shown in Chapter VI. Costs by population groups are shown in the Appendix. The 20-year

PROPOSED 20-YEAR MAJOR STREET IMPROVEMENTS

City of Brantford

Projects shown illustrate the scale of work needed to deal with present and future traffic problems. They do not necessarily represent firm engineering plans or official commitments.

	King's Highway urban extensions	Arterial streets
Widening	●●●●●	●●●●●
Reconstruction	▬▬▬▬	▬▬▬▬
Widening and reconstruction	●▬●▬●	●▬●▬●
New construction	▬▬▬	▬▬▬
New structure	○	○

needs are shown in the table below. The sharing of these costs will be determined by future legislation.

System	*Cost*
King's Highway urban extensions	$ 155,[illegible]0,000
Expressways	498,[illegible]75,000
Arterial streets	693,300,000
Local streets	754,663,000
Total 20-year construction needs	$2,102,[illegible]7,000

MAJOR STREETS

About four-fifths of all travel in Ontario cities and towns is on King's Highway urban extensions and the arterial streets. Detailed study shows that their improvement, along with construction of expressways, makes up two-thirds of the needed urban street construction program.

Because of their extreme importance, every mile of the urban extensions should be improved in some

More street capacity is needed to get rid of costly congestion resulting from heavy rush-hour traffic on major streets in Ontario. Two-thirds of the 20-year construction costs will be needed for King's Highway urban extensions, arterial streets and expressways.

MAJOR STREETS
CAPITAL CONSTRUCTION NEEDS

	Needed Now	*Needed in 1-10 years*	*Needed in 11-20 years*	*Total Needs in 20 years*
King's Highway urban extensions	$ 43,074,000	$ 70,714,000	$ 41,281,000	$ 155,069,000
Expressways	286,431,000	162,744,000	49,800,000	498,975,000
Arterials	226,080,000	281,374,000	185,936,000	693,390,000
Total	$555,585,000	$514,832,000	$277,017,000	$1,347,434,000

manner during the next 20 years. The types of improvements are shown in the table below.

Construction of expressways is a pressing problem. They channelize large traffic flows bound to, from and around city areas and provide general circulation within and near the city itself. Although only 96 miles of expressways are projected in Metropolitan Toronto, Hamilton, Ottawa and London, their completion would bring a tremendous advance in the convenience and usefulness of the motor vehicle.

CONSTRUCTION NEEDED ON MAJOR STREETS
20-year Period

Character of Work	*King's Highway Urban Extensions* (miles)	*Expressways* (miles)	*Arterial Streets* (miles)
Resurface only	266	—	566
Reconstruct or widen	522	—	2,133
New streets	10	96	326
Total	798	96	3,025
No. of structures	170	251	422

Arterial streets urgently need modernization to perform adequately their function of handling large traffic volumes within the city area. Today there are 1,960 miles of arterials. This study projects an additional 326 miles to be built within the next 20 years. Since many sections of arterials should be worked on more than once during that period, the projects total more than 3,000 miles.

Involved in the major street program is construction of 843 structures such as rail and highway grade separations, traffic interchanges and bridges.

BACKLOG NEEDS

Postponement of so much major street construction in the past is the reason for the large amount of work needed now and in the next 20 years.

Of the total needs of $1,347,000,000 on the urban extensions, expressways and the arterial streets, $556 million is backlog—41 percent of the total. As shown by the above table, during the next 10 years almost an equal amount is required to keep abreast of traffic needs.

Those large figures point to the urgent need for accelerating major street construction if reasonably adequate facilities are to be provided.

LOCAL STREETS

Traffic congestion is seldom a problem on residential and other local streets. Paving to reasonable width, accompanied by adequate drainage, is the prime need. As shown in the inventory of present conditions in the table below, 26 percent of local

	Mileage Adequate	*Mileage Inadequate*	*Mileage Total*
High type pavement	2,717	589	3,306
Surface treated	261	1,695	1,956
Earth and gravel	—	1,811	1,811
Total	2,978	4,095	7,073

streets are unpaved and less than half are high type surface. About 58 percent are rated as inadequate today.

Total capital investment estimated to bring local streets up to appropriate standards in the 20-year period is $754,663,000 or about $37.7 million per year on the average. The study estimated that the local streets would be improved gradually at a constant rate over the years, with the more urgent requirements determined by each municipality. At this rate, half of all new improvements needed would be completed within 10 years, along with the necessary resurfacing or repaving of existing streets

It is estimated that about 3,000 miles of new residential streets will be needed in the next 20 years to serve expanding populations. Most of the cost for such streets probably will be borne by subdividers of property, as is required now by Metropolitan Toronto. However, the requirements vary widely in other municipalities. Therefore, the entire cost for the 1,500 miles of added streets outside of Metro area has been included in the preceding estimates.

At the end of the 20-year period, the residential street program would provide for 4,800 miles of well-paved, 30-foot streets with curb, gutter, drainage and sidewalks, some 2,900 miles of 24-foot paved streets with shoulders and adequate drainage in out-

Facilities that restrict and endanger traffic, such as this outmoded railway separation at Smith's Falls, must be replaced with modern structures.

To serve expanding residential areas, some 3,000 miles of additional streets will be needed in the next two decades.

Only construction of expressways can fully relieve congestion in Ontario's larger cities. Mass flows of traffic require multi-lane roadways, interchanges and grade separations, such as mark this development along Toronto's lakefront.

lying areas, and reduce the unpaved miles to about 900—all graveled—entirely on the fringe areas of smaller towns.

METROPOLITAN TORONTO

Metropolitan Toronto constitutes the Province's greatest concentration of population, industry and commerce, and so has a large proportion of major street construction needs—55 percent of the total.

Traffic problems have been growing more and more acute year after year despite efforts of various individual municipalities. These efforts, valuable as they were, could not be expected to succeed because of conflicting ideas in the treatment of highway and streets having an area-wide function. Since the formation of the Metropolitan Municipality in 1954, efforts have been directed at dealing with traffic problems for the greatest common good.

The expressway plan developed by the Municipality of Metropolitan Toronto, described in the next section, has been made a part of this study. The projected 59-mile expressway system was developed by Metro with recognition given to development of other streets, as well as to rapid transit and the effects of its expansion.

The following table summarizes the 20-year major street construction needs of Metropolitan Toronto.

Character of Work	*Miles of Work*	*Cost of Work*
Resurface only	135	$ 13,690,000
Reconstruct and widen	838	244,054,000
New streets	74	25,375,000
Expressways	59	243,870,000
Structures (280 in number) (including expressways)	—	205,039,000
Traffic control and illumination (including expressways)	—	5,269,000
Total	1,106	$737,297,000

METROPOLITAN TORONTO EXPRESSWAY PLAN

The expressway plan used as the basis for this study is shown on page 26. Sections already constructed are the western end of the F. G. Gardiner

EXPRESSWAYS SAVE LIVES, TIME AND MONEY

Expressways embody all features that make a highway safe and enable it to carry heavy traffic flows.

Although costly, it has been demonstrated that through savings in safety, time and money they pay for themselves within a reasonable period.

A true expressway, or freeway, is a multilane highway with a wide divider separating opposing traffic, wide traffic lanes and shoulders, and fully controlled access which eliminates intersections at grade and direct access from adjoining properties.

Cross traffic along expressways is served by interchanges and grade separations. Ingress and egress for expressway traffic are provided by special lanes to eliminate interference with through traffic. Where justified, parallel service roads serve abutting property and connect with the expressway at convenient points.

Those features enable the expressway to carry much larger volumes of traffic per lane, at greater speed and safety, than the ordinary arterial. Each traffic lane on an expressway can move 1,500 vehicles an hour at speeds around [illegible] miles per hour. An ordinary arterial can carry only 300 to 700 vehicles per lane, depending on conditions, at much lower speeds. To the driver, expressway benefits are manifold: reasonable and maintained speeds, virtually no head-on crashes, non-stop driving with no cross traffic, traffic signals or pedestrians to worry about.

Several thousand miles of expressways are now in service throughout the world. A variety of studies have shown that on them traffic fatality rates are usually only a third, rarely more than half, of the rates on all other roads and streets.

Expressways generally reduce travel time—not distance—by one half or more. This means doubled convenience and a greatly increased radius for community growth.

Savings in time are not imaginary. This was demonstrated in test runs made by the Ontario Department of Highways on an expressway as compared with an arterial street in Metropolitan Toronto. As the accompanying table shows, rush-hour trips of approximately the same length took less than half the time on the expressway as required on the arterial. Note the other expressway advantages, particularly fewer stops and brake applications.

	Station Wagon		Truck Transport	
	Expressway	*Arterial Street*	*Expressway*	*Arterial Street*
Trip length	28 miles	25 miles	28 miles	25 miles
Time of trip	34 min.	83 min.	41 min.	102 min.
Average speed	49.4 mph	18.1 mph	41.0 mph	14.7 mph
No. of stops	0	55	0	56
No. of gear shifts	1	163	14	231
No. of brake applications	5	101	18	97
Gasoline used	1.2 gals.	1.4 gals.	5.2 gals.	7.1 gals.

The economic desirability of expressways may be summarized—

Expressways move more than twice as many vehicles per lane per hour, at much faster speed, with up to three times the safety, and at less car operating cost to the motorist than other facilities.

METROPOLITAN
TORONTO

Expressway Plan

Proposed expressways
Existing freeways (expressways)
King's Highways
Other major roads and streets

Expressway and those sections built by the Department (The Queen Elizabeth Way, Highways No. 27, 400 and 401). The basic studies have already been carried out to help determine the location and design of the rest of the system but further analysis of the data is needed. Continuing studies are to be made and the plan will be modified according to the findings.

The plans call for an inner loop around the Central Business District of the Metropolitan area—the downtown section of Toronto. This would include the Crosstown Expressway, and parts of the F. G. Gardiner Expressway, the Don Valley Parkway and Highway No. 400 Extension.

An outer loop, serving practically all the area, would include the remainder of the Gardiner Expressway, Highway No. 401 and part of Highway No. 27. Between the two loops, traffic would be distributed by a series of radial expressways which, through northerly extensions, would serve the outlying areas.

The expressway plan, as the map indicates, is designed to provide the utmost service which can be obtained only when expressways are well integrated with both the street system and the rural highways. Continued cooperation of all government agencies involved is necessary to achieve accomplishment of full benefits.

THE OVER-ALL PROBLEM

Because of their concentrated development and increasing dependence on the motor vehicle, urban centres face a huge task. While the solution is not easy, the fact remains that a solution is possible. As emphasized in the final chapter, sound planning, cooperative effort and bold action are the means of providing facilities demanded by the economy.

CHAPTER FOUR

County and township roads compose the predominant mileage shown on the map on page 10. They total 64,500 miles, three-fourths of all Provincial roads and streets.

To the people who live along them, these highways are the most important in the world.

They carry relatively light traffic, yet they are a vital part of Ontario's highway transportation network. Over these local roads basic materials and produce start their travel to market, mill and factory. They are two-way roads—for example, the timber that goes to the distant mill may in part return as lumber or as a newspaper or magazine.

The engineering survey of needs on the county and township roads has uncovered problems no less challenging, although different in many respects, than on the more heavily travelled routes.

Capital expenditures needed on county and township roads over the next 20 years total $1,062,029,000. Of that, $358,815,000 is for construction on county roads and $703,214,000 for construction on township roads. Maintenance and operation of these systems, described in Chapter VI, add substantially to the total.

COUNTY ROAD SYSTEM

County roads, together with King's Highways, have long functioned as the arterial and connecting system within each county. Located in the southern part of the Province, these roads total about 9,300 miles, with 8,250 miles under direct county administration, and 1,050 miles under the administration of Suburban Road Commissions. In the latter case, representatives of both county and city or separated town direct the work on county roads of special importance to the city or separated town.

The mileage in individual counties varies from a low of 120 miles in Brant County to a high of 515 miles in Middlesex County. County roads carry traffic of from less than 50 to over 10,000 vehicles per day, with the average about 500. The bar chart on the next page shows the miles of roads carrying various ranges of traffic volumes.

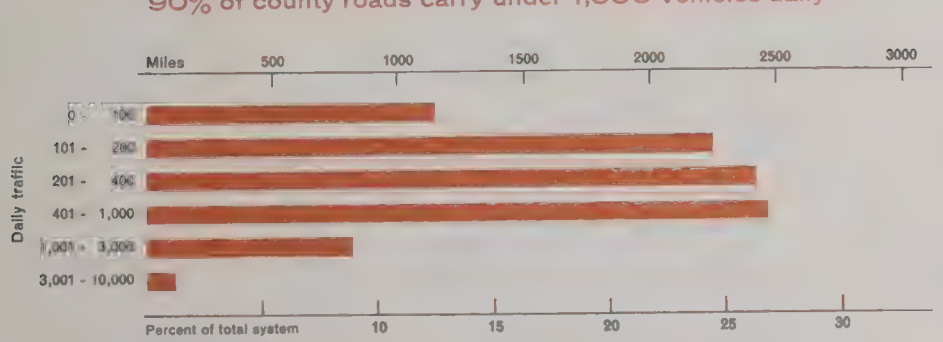
County and suburban road systems, as of December, 1957, consisted of the following surface types:

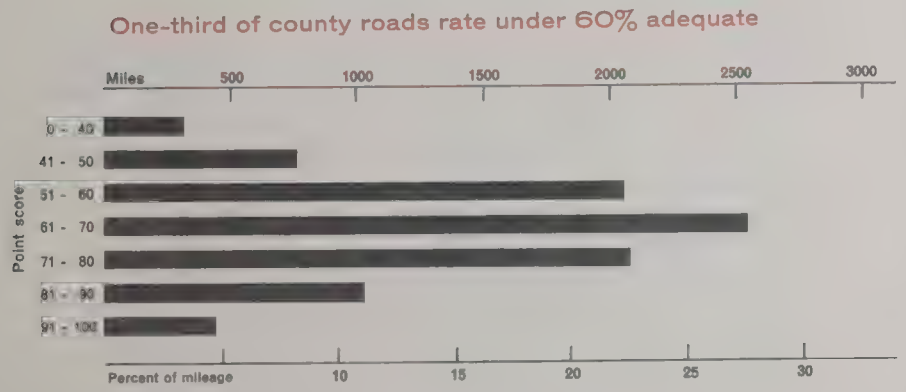
	Miles	*Percent*
Concrete	126	1
High cost bituminous	1,369	15
Low cost bituminous	3,424	37
Gravel or stone	4,292	47
Unsurfaced	6	—
Total	9,217	100

In addition, the counties are responsible for 125 miles of urban streets in towns and villages. The costs for these 125 miles are included with the urban costs in Chapter III.

COUNTY ROAD RATINGS

A scoring or rating system was established to guide the analysis of county road needs, as mentioned in Chapter II. A score was given to each road based on its present measurements and condition compared to a standard that was fully adequate for the road's traffic and service use. A road which met all parts of the standard scored 100. Few made a perfect score, but many roads approached it, at least for the present. A number rated low as may be seen in the accompanying chart. Some 1,075 miles rated under 50—an indication that these roads are only about half as good, or less, as they should be for present





As the top chart shows, traffic volumes vary widely on county roads. Many roads now carry sufficient traffic to warrant considerably better improvement than they have received, as indicated by the lower chart. The point score rating system is described on Page 27.

traffic. The ratings were an invaluable aid in determining the degree of deficiency and the urgency of improvement. They should be of future assistance in planning individual county work programs.

DEFICIENCIES

The field inventory made in the course of this study indicated that 1,488 miles, or 16 percent of the total system, are deficient now, and in need of immediate capital improvement.

Deficiencies are: poor over-all ratings, 1,075 miles; narrow width, 569 miles; and inadequate surface, 357 miles. Many miles are inadequate for more than one reason.

In addition, of the 1,847 bridges under county responsibility, a third, 620, are now in intolerable condition. All of these latter bridges are too narrow and more than half of them are also too weak. Moreover, 52 bridges should be added to the county systems now. Of the 725 railway level crossings on county roads, 336, or 46 percent, are in need of better protection now.

The backlog of current needs, amounting to 95.5 million dollars, is a heavy responsibility. But as roads wear out and traffic increases, new needs will arise. Within the 20-year study period, nearly all county roads and two-thirds of all bridges must be improved further or replaced, in addition to normal maintenance.

CAPITAL NEEDS

The appraisal of county roads shows construction needs over the next 20 years amount to $359 million

COUNTY ROADS

	Needed now	*Needed in 1-10 years*	*Needed in 11-20 years*	*Total Needs in 20 years*
CAPITAL CONSTRUCTION NEEDS				
Roads and rail crossings	$61,487,000	$161,571,000	$82,170,000	$305,228,000
Bridges	33,991,000	12,250,000	7,346,000	53,587,000
Total	$95,478,000	$173,821,000	$89,516,000	$358,815,000
PHYSICAL CONSTRUCTION NEEDS				
Roads (miles)	1,488	4,505	2,689	8,682
Bridges (number)	672	309	182	1,163

BACKLOG NEEDS ON COUNTY ROADS

The brown dotted lines show the location of construction projects needed now to correct deficiencies on the county road system. In addition, many bridges and railway crossings require improvement at the same time.

at 1957 prices, as shown in the accompanying table. Other costs for future capital replacement, temporary or stop-gap construction, maintenance and administration must be included in the total program, shown in Chapter VI.

It is apparent that there is a large volume of work needed now on the county systems, with the rate of obsolescence such that the needs will increase sharply in the next 10 years. Within this period, $269 million should be invested in roads and bridges, 75 percent of the total 20-year needs for capital expenditures alone.

COUNTY PROBLEMS

All counties have common problems, but of varying degrees of complexity. Some have complicated planning problems due to suburban development. Others have problems in meeting increasing road expenditures while their assessment remains static. Needs for each county are shown in the Appendix.

Few new roads are needed—the main job is one of remodelling existing facilities so that they can serve present and future traffic more safely and effectively. Raising of grades for better drainage and wind-clearing of snow, widening of surfaces and shoulders for larger vehicles and safer driving, elimination of bad curves and grades, replacing dangerous bridges—all this will gradually produce modernized county road systems. The work to be done over 20 years on roads, excluding bridges, is:

Resurfacing and widening	2,947 miles	$ 86,103,000
Reconstruction	5,485 miles	200,236,000
New construction Including relocation	250 miles	18,889,000
Total	8,682 miles	$305,228,000

Of those totals, about 12 percent is for right-of-way, 23 percent for grading and drainage, 55

Top: By 1977 nearly all county roads should be hard surfaced, have wide shoulders, good grading and alignment. The modern road above is in Peel County.

Right: On this construction project in Grey County a hill is being cut down to provide a better grade for a county road. Proper grading reduces maintenance costs and makes snow removal easier.



Left: Because of high maintenance costs where there is reasonably heavy traffic, gravelled roads should be paved as soon as practicable. The road on the left in Waterloo County has been hard surfaced since this photograph was taken. Centre: This bridge, near Massey, is one of many township bridges requiring replacement. Right: On many narrow, poorly graded township roads snow removal is difficult, sometimes impossible. The snow scene was taken in the Township of Cambridge.

percent for road base and surface, and 10 percent for culverts.

In total, if the program is accomplished, in 20 years nearly all of the county systems will be paved. Compared to the 1957 inventory, the 1977 prospect appears as follows:

	1957 Miles	*1977* Miles
Paved	4,919	8,816
Gravel	4,292	401
Earth	6	0
	9,217	9,217

This study has shown the scope and character of the big job facing the counties. Accomplishments of the past 20 years have been considerable, even though a sizeable backlog of work exists. But the widely varying county road financing, planning and engineering activities indicate the need for more unity and strength in the future.

TOWNSHIP ROAD SYSTEM

Some 55,000 miles of road in the Province are under the jurisdiction of organized townships, statute labour boards, indian reserves and improvement districts. These roads generally carry the fewest vehicles per day of any of the systems, yet in total, they provide an indispensable service by giving local access to the rural areas.

However, within this general category exists a group of suburban townships near the urban centres of Southern Ontario, and some urban centres in Northern Ontario which have retained their original form of local government. These townships have authority over 2,260 miles of road which are more in the nature of urban streets than rural local roads, and which have the same ills and problems as the urban centres discussed in Chapter III. Because of the materially different characteristics of the roads and streets in these suburban townships, they were studied separately.

Most township and other local roads are gravel or unsurfaced, as shown in the following inventory:

	Miles	*Percent*
Concrete	65	—
High cost bituminous	641	1
Low cost bituminous	515	1
Gravel or stone	44,114	80
Unsurfaced	9,814	18
Total	*55,149	100

*Includes some mileage studied as urban streets.

The study indicates that about 2,700 miles of pavement should be added within 20 years, and most of the unsurfaced roads should be gravelled.

DEFICIENCIES AND NEEDS

The light traffic on most township and other local roads has neither required the heavy construction necessary on other road and street systems nor encouraged intensive engineering planning and design. Moreover, the relatively small mileage under control of each individual council or board has not, with some exceptions, made possible the continued availability of adequate construction and maintenance equipment and personnel.

As a result, many township roads do not provide year-round service due to uncorrected poor soil and drainage conditions. Road surfaces often are not heavy enough to withstand spring break-ups and in winter they easily become snow clogged. Bridges and culverts are narrow and repairs often are delayed until weather and loads cause failure.

The situation has become critical in suburban townships where rapid residential expansion has overloaded township resources. Demands for wholly new streets keep mounting. All these townships were studied separately, and a representative sample of rural townships and other jurisdictions was analyzed and expanded to obtain a general view of the entire problem.

Since so many thousands of miles are in about the same general condition, and since the rate at which improvements may occur is dependent on actions of the many hundreds of individual agencies, the needs have been established for the 20-year period only. The study indicates that the total construction needs are $703,214,000 for the next 20 years, divided as shown in the table below.

For capital needs alone, the costs average nearly $1 million per township for the period, or about $50,000 per year. Maintenance requirements, shown in Chapter VI, add substantially to that total.

Although township needs vary widely, being more or less than the above average costs, the size of the problems confronting them points to the need for stepping up the rate of improvement. If that can be accomplished, together with improved maintenance, the benefits will be appreciable.

School bus service, mail delivery, milk hauling and other businesses will be more easily obtained or serviced and at less cost. Timbering and mining will receive essential services. Tourists will reach destinations more readily with little mud or dust to worry about. Rural residents, however, will be the greatest beneficiaries through the ease and regularity with which they can carry on normal business and social activities.

But these things will not just happen—nor will money alone solve the problems. Serious attention must be given to improved planning, engineering, materials and methods. This will require closer relationship among all levels of government, as discussed further in Chapter VI.

TOWNSHIP ROADS

CAPITAL CONSTRUCTION NEEDS

	Suburban Townships	*Rural Townships*	*Total*
Roads	$158,311,000	$406,324,000	$564,635,000
Bridges	4,786,000	133,793,000	138,579,000
Total	$163,097,000	$540,117,000	$703,214,000

This photograph, in the Township of Louth, illustrates two of the many vital services of local roads—school bus operation and carrying the mail.

CHAPTER FIVE

The backbone of Ontario's highway network is the King's Highway system.

The system, for which the Provincial Government is fully responsible, connects all major cities of the Province and other Provinces and the States. It provides main-line service to all agricultural, mining, timber and recreation regions. Most longer distance, higher speed trips are on the King's Highways. They carry 41 percent of all road and street travel and 69 percent of all rural travel, on 11 percent of all Ontario's mileage.

The December 1956 report, "A Plan for Ontario's Highways" provided a detailed analysis of the system and of secondary highways, also a Provincial responsibility, together with estimates of needs and costs for proper development. That study has been of great value to the Department of Highways in planning and developing its program, and to the Provincial government in considering finances necessary to carry it out.

Capital expenditures on Provincial highways in the last two years reached new highs, totalling $237 million, in an effort to reduce the backlog reported in the study and apparent everywhere. Construction was speeded up on Highway No. 401, the Burlington Skyway was completed, the Trans-Canada Highway was advanced, a start was made on the Ft. Francis—Atikokan causeway, the Humber River bridge and interchange at Metropolitan Toronto limits was completed, along with expansions of the Queen Elizabeth Way to six lanes for some distance, and about 30 miles of existing highways were converted from two to four lanes. Many bridges were built, and railroad level crossings were eliminated. Beyond these and other major projects, many more miles were resurfaced, curves straightened and otherwise improved.

Nevertheless, present and future needs remain large. This chapter reports results of a re-appraisal of capital costs made necessary by a more complete integration of rural and urban planning, new data and changed prices. This new report takes account of work done or under way, and provides for a planned program developed for the same 20 year period, and on the same basis, as for the municipalities of Ontario.

CAPITAL CONSTRUCTION NEEDS

The re-appraisal shows that $1.4 billion of capital funds, at 1957 prices, should be invested during the next 20 years for proper development of rural Province-controlled routes, exclusive of work in cities and towns. This is 16 percent less than found necessary in the study of two years ago. Other costs for future capital replacement, temporary stop-gap construction, maintenance and administration must be included in the total program, shown in the next chapter.

Of the 20-year capital construction costs, stated in the "Capital Construction Needs" table, $476 million is needed right now—the balance is work that will accrue as traffic increases and older pavements wear out. The Department has made some gains in overcoming the backlog of work needed now, since that figure has been considerably reduced in the intervening two years. Nevertheless, strenuous effort is required to catch up to already existing traffic demands, and within 10 years, another $518 million will be needed.

Physically, the work involved in the backlog alone covers 2,553 miles on King's Highways and

BACKLOG PLUS 5-YEAR NEEDS ON KING'S HIGHWAYS

Southern Ontario

Shown in brown are the construction projects needed on the King's Highway system to take care of highway and bridge deficiencies existing as of April 1958 and accruing within five years. Most of the remaining mileage on the system shown by white lines will require improvement some time later within the 20-year study period.

2,007 miles on secondary highways that should be built or improved as soon as possible to remedy intolerable conditions that existed on April 1st, 1958. Also needed are 871 bridges and 68 railroad grade separations. Total requirements are shown in the "Road and Bridge Construction Needs" tables. The maps on pages 34 and 35 show the backlog plus five year needs on King's Highways.

SYSTEMS DEVELOPMENT

As a result of the work this study anticipates, the nature of the King's Highway system and secondary highways will change in keeping with the great increases expected in population and traffic over the next 20 years.

The objectives are to accomplish the most important work first, to eliminate the backlog needs, and then keep abreast or ahead of future needs.

The study shows that the King's Highway system should grow from its present 8,988 miles and 1,640 bridges and railroad grade separations to 9,870 miles and 1,912 structures, as new facilities are added.

Mileage of multi-lane highways should become much greater. From the present 394 miles, the next 20 years should see development to a total of some 1,730 miles of four lanes or more. Of these, at least 1,300 miles should be full freeways, with no intersections at grade, no traffic signals and no direct access to abutting property. Such facilities, Highways No. 400 and 401 being examples, provide the highest type of traffic service, allowing large numbers of vehicles to travel swiftly and more safely. It is estimated that 40 percent of all rural King's Highway traffic will use the freeways, which will comprise only 13 percent of the King's Highways.

Many other urgent needs—for bridges, for reconstruction of worn out pavements, for new roads in developing areas, for widening and straightening for extra safety—require part of each highway dollar.

Few, if any, of the King's Highways or secondary highways will remain in their present form within the 20 years.

Although 86 percent of the combined mileage will remain two lanes wide, their improvement will require only 66 percent of the necessary roadway

BACKLOG PLUS 5-YEAR NEEDS ON KING'S HIGHWAYS

Northern Ontario

PROVINCIAL HIGHWAYS

	Needed now	*Needed in 1-10 years*	*Needed in 11-20 years*	*Total Needs in 20 years*
CAPITAL CONSTRUCTION NEEDS				
King's Highways	$392,908,000	$504,575,000	$390,284,000	$1,287,767,000
Secondary highways	83,544,000	13,832,000	590,000	97,966,000
Total	$476,452,000	$518,407,000	$390,874,000	$1,385,733,000
ROAD CONSTRUCTION NEEDS (MILES)				
King's Highways	2,553	4,111	3,808	*10,472
Secondary highways	2,007	286	6	2,299
Total	4,560	4,397	3,814	*12,771
BRIDGE CONSTRUCTION NEEDS (NUMBER)				
King's Highways	636	260	167	1,063
Secondary highways	303	21	—	324
Total	939	281	167	†1,387

*includes 686 miles of second stage construction i.e. adding lanes to previous projects.
†including 153 railroad grade separations

Here are pictured two types of deficiencies on the King's Highway system. Many miles need resurfacing and straightening, such as this section of Highway No. 15. More than a thousand new or replacement bridges and railway grade separations are among projected improvements. The sharply curving, narrow underpass is on the same highway near Ottawa.

Because they carry the heaviest traffic volumes in rural areas, including nearly all through traffic and transports, the King's Highways must be built to modern standards, with wide traffic lanes and minimum curves and grades. For safety, bridges are built comfortably wider than the approaching roadways. (Top, north of Point Au Baril; bottom, Little Pic River bridge.)

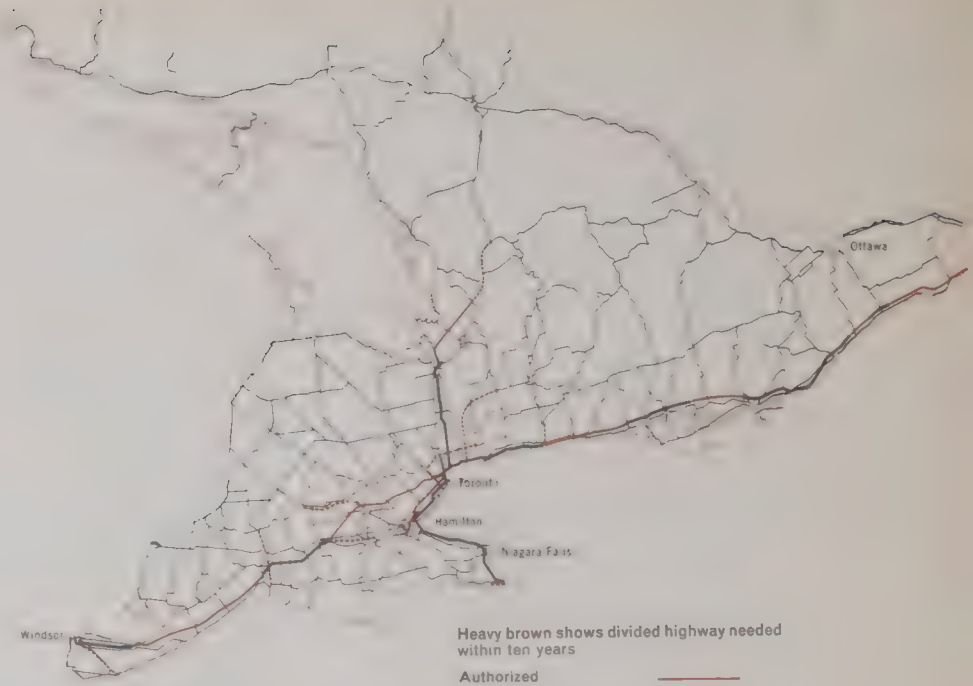
funds. Some $407 million will be needed for multi-lane roadways—about 34 percent of the cost, plus structures. Work required is shown in the accompanying table. Of the total cost, nearly eight percent will be required for right-of-way.

NORTHERN DEVELOPMENT

The survey of needs was basically an engineering study. The subject of development of northern resources and needed roads was considered beyond the scope of this survey. Therefore, to a large extent, the study was confined to the future growth needs of existing roads, populations, and traffic demands. Needs on northern development roads would be determined by a broader study involving more than engineering considerations.

ADVANCE PLANNING

Advance planning of the King's Highway System includes many major projects to be designed for areas of rapid growth and for the economic expansion of the Province. Evidence of forward-looking engineering is readily apparent, for example, in decisions and plans to complete rapidly the 550 miles of trans-provincial Highway No. 401, to close the Lake Superior gap of the Trans-Canada Highway, and to develop the Queen Elizabeth Way to full freeway design with added traffic capacity. These are sweeping decisions of great benefit, yet



Heavy brown shows divided highway needed within ten years

- Authorized
- Proposed
- Existing divided highways
- Other King's Highways

KING'S HIGHWAYS AND SECONDARY HIGHWAYS

20-YEAR CAPITAL CONSTRUCTION NEEDS
(includes right-of-way costs)

	Miles	*Total Cost*	*Cost Per Mile*
TWO LANES			
Resurfacing and widening	1,453	$ 26,874,000	$ 18,500
Reconstruction	8,585	730,818,000	85,000
New construction	317	50,343,000	159,000
MULTI-LANES AND FREEWAYS	1,730	406,579,000	235,000
Sub-total	12,085	$1,214,614,000	
	Number		*Per Structure*
STRUCTURES	1,387	$ 168,791,000	$121,700
RAIL CROSSING PROTECTION	279	2,328,000	8,000
Total cost		$1,385,733,000	

10-YEAR NEEDS FOR DIVIDED HIGHWAYS

Traffic congestion will require that within 10 years about 550 miles of multi-lane highway should be added to the 390 miles presently existing on the King's Highway system.

Secondary highways serving northern areas have a large backlog of needed construction to standards as shown on Secondary Highway No. 522 near Gold Valley.

they are but forerunners of the broad approach to planning for the future.

Recently, for example, special study has been given to the Toronto-Hamilton traffic corridor and to the region between Toronto and Lake Simcoe. The former will become an area of great population growth, with industry and commercial centres oriented to both Hamilton and Toronto. Traffic demands will jump, and new freeway facilities, as well as supplemental roads and streets, must be provided. Studies show clearly the importance of the Chedoke Expressway through and around Hamilton—a hub of traffic from and to all areas of the Province.

North of Metropolitan Toronto, potential land development, plus a great trek to resort areas, calls for a major new artery to Lake Simcoe and the north country. A new freeway, tying into the Don Valley Expressway to the heart of Toronto, plus expansion of Highways No. 401 and 7 in the south, and extension of No. 400 in the north, will go far towards serving the needs of this area.

As reference to the map on page 37 will reveal, these and many other facilities are designed for relief of heavy traffic congestion in the vicinity of, and between, the major cities of the Province. All are included in the costs reported here, as are numerous less spectacular, but important projects. The Department of Highways, in cooperation with other agencies, expects to continue its special regional studies and to develop in more precise detail the potentials and highway needs of each region.

PRIORITY OF WORK

The 1956 study covered in detail the various factors that influence decisions concerning the locations

King's Highways must be built for a variety of traffic volumes. Generally, two-lane pavement suffices, but where traffic is heavy, freeways with up to eight lanes must be provided. At the right are Highway No. 401 north of Kingston, and the recently completed Freeman By-pass.

that should be improved each year. Major factors are—

- amount of money available
- commitments, agreements and completions
- consistent development of entire routes
- importance to economy and urban development
- traffic volumes benefitted
- cost of improvement related to benefits
- distribution of work throughout the Province
- planning, design and right-of-way problems
- relative inadequacy of each road section.

The current re-appraisal provides a better foundation of data for aiding the selection of annual work programs within the framework of the long-range plan. It gives a more realistic estimate of costs involved, as a basis for determining needed funds; has indicated the general standards required for consistent long-term route development, including better coordination with city problems; and has established better and up-to-date measures of the relative adequacy of road sections, including bridges and grade separations.

RELATIVE ADEQUACY

There is no simple or easy way to decide what work should be done first. The highway needs are so great that no one person can grasp all the problems and make the wisest decisions of greatest benefit without a systematic analysis of *all* the facts that should have a bearing on the selection of work.

One of the best tools available is a Sufficiency Rating system which accounts for most of those facts. These are organized in three significant groups:

1. Structural condition—of pavement, base, shoulders and drainage, with attention given to maintenance needs
2. Traffic capacity—of the highway to carry existing traffic volumes at reasonable speeds
3. Geometric design—related to standards of width, curves, grades and sight distances necessary for safety and ease of travel for present traffic.

In using this method each highway section is compared to a proper standard for that location and traffic. For each group of facts, the actual rating indicates the percent of adequacy. Thus, a

highway section completely adequate in all respects receives a 100 percent rating; another section, for example, may rate 100 percent for structural condition, but only 60 percent in geometric design and 40 percent in traffic capacity.

The accompanying chart shows a summary of ratings for all King's Highways. Some 1,900 miles are less than 40 percent adequate in structural condition, for example. Some road sections rate low in all three categories, and so should qualify for early improvement. Other sections may rate high in two categories, but very low in one; such a road should also be considered in a priority program.

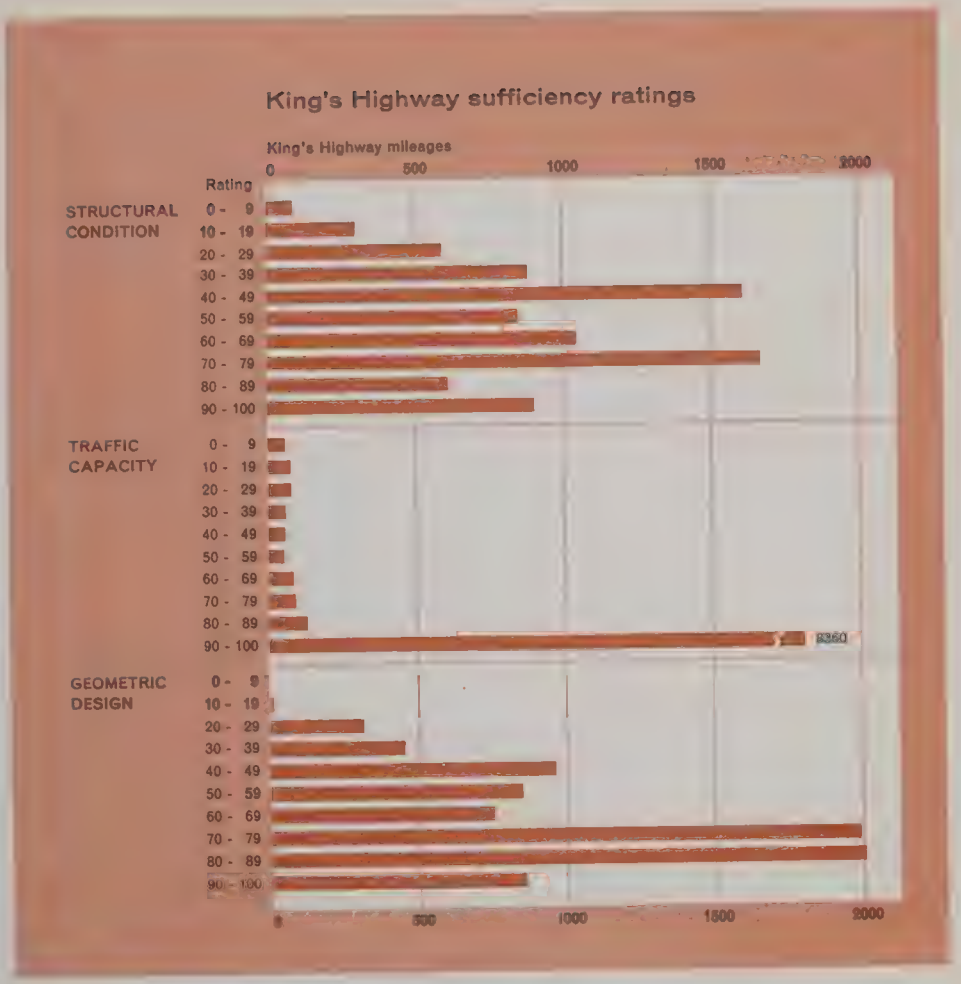
The Department is making good use of this rating system in developing its annual programs, which also take into account the other factors previously discussed.

CONCLUSION

Faster progress is being made towards meeting the heavy traffic needs on the King's Highway system. Nevertheless, the backlog of work, and the future modernization required to meet increasing growth, pose major problems for years ahead. Together with proper development of secondary highways in the northern areas of the Province, over a billion dollars worth of work should be done within 10 years.

Added costs for maintenance and other work necessary to preserve the tremendous present and future investment in the highway systems will be required, as shown in the next chapter. Moreover, the Province has a great interest in the requirements of urban areas and rural municipalities.

The administrative, engineering, planning and coordination of the future highway development program requires a continued and improved high level of personnel and cooperation among all agencies of government.



CHAPTER SIX

Ontario's total highway, road and street needs, and the many problems involved in meeting those needs, are set forth in this report for the first time.

All kinds of roads are needed to serve Ontario's nearly six million people whose vehicles travel 16 billion miles per year—and more people, more vehicles and more travel are in the offing.

The needs of the 84,000 miles of roads and streets differ widely, from simple grading on infrequently used roads to costly multi-lane facilities demanded by heavy traffic flows. Measurement of the needs was done in a painstaking, exhaustive manner, and importantly, on a conservative basis.

Meeting the vast array of needs naturally will require huge expenditures, which over the next 20 years are estimated at a grand total of $7.2 billion. This includes investment in construction and costs of maintenance and administration for all Provincial and municipal roads and streets. However, that tremendous outlay assumes practical proportions when considered on the basis of average cost per vehicle mile of travel. The 20-year total cost is the equivalent of 1.2 cents per vehicle mile, as compared with 1.5 cents expended over the last decade.

Preceding chapters have shown only the principal capital improvements required for each of the road and street systems. This chapter rounds out the picture by including depreciation, maintenance and administration for all systems. All costs are at 1957 price levels. In presenting the size of the problem confronting the jurisdictions a basis is provided for considering methods of financing and determining cooperative policies necessary to produce adequate facilities for a period of time consistent with a reasonable life expectancy of the facilities themselves. This total measurement is particularly valuable because of the role played by Provincial subsidies in financing highway improvement and maintenance.

SYSTEM REQUIREMENTS

To achieve long-range balanced programs of development in keeping with respective needs, consideration must be given to the relative requirements of each system and to the finances available to each concerned governmental agency. This section summarizes expenditures that should be made by the Department of Highways and by the rural and urban municipalities prior to 1978 if the expected needs are to be met adequately.

COST ELEMENTS

The major costs in the total program are the capital construction costs, detailed in earlier chapters, for improvements which are or will become necessary. Those costs total $4.5 billion over the next 20 years.

Added capital costs are necessary, however, to avoid undue depreciation of facilities. These costs are for: (a) relatively small amounts of remedial construction done during the normal life span of the facility, especially on roads built early in a long-range program, and (b) "stop-gap" construction of relatively low standard designed to defer temporarily major improvements for which funds are not available when needed. No specific locations for these two types of construction can be identified in advance, but statistical experience with large groups of roads indicates the approximate amounts. Such costs depend, of course, on how fast the work is accomplished or on how much must be deferred.

Finally, maintenance and administrative expenses must be added to all other costs.

ALL ROADS AND STREETS—20-YEAR COSTS

at 1957 price levels

	Capital Improvements	*Maintenance and Administration*	*Total*	*Percent*
URBAN MUNICIPALITIES				
King's Highway urban extensions	$ 167,820,000	$ 71,760,000	$ 239,580,000	3
Expressways	558,040,000	46,200,000	604,240,000	9
Arterials	755,700,000	209,660,000	965,360,000	14
Local streets	761,860,000	257,000,000	1,018,860,000	14
Sub-total urban	$2,243,420,000	$ 584,620,000	$2,828,040,000	40
COUNTY ROADS	456,344,000	275,416,000	731,760,000	10
TOWNSHIP ROADS	703,214,000	451,126,000	1,154,340,000	16
PROVINCIAL HIGHWAYS				
King's Highways	1,400,760,000	776,480,000	2,177,240,000	30
Secondary highways	122,400,000	139,140,000	261,540,000	4
Sub-total provincial	$1,523,160,000	$ 915,620,000	$2,438,780,000	34
ALL ROADS AND STREETS	$4,926,138,000	$2,226,782,000	$7,152,920,000	100

20-YEAR NEEDS

All cost requirements for each system in a 20-year period from 1958 through 1977 are shown in the accompanying table. Complete capital needs total $4.9 billion, with $2.2 billion more required for maintenance and administration. Of the grand total of over $7.0 billion about 40 percent is needed on streets in urban municipalities, 34 percent on rural Provincial highways, and the balance on county and township roads.

Were the expenditures indicated in the table made on each system, and if prices do not change materially from 1957 levels, it is estimated that within the 20 years all roads and streets could be developed properly and maintained satisfactorily to meet requirements of the expanding population which is expected to generate two and a half times the present highway use.

Total needs could be met gradually, as shown in the accompanying chart, by increasing current expenditures of the Province and the municipalities, which in 1957 totalled $276 million, by annual increments of about $7.8 million. At that rate, for example, some $354 million would be expended in 1967.

However, about 23 percent of all capital costs are improvements needed today—for *today's* traffic. That backlog of work varies on each system. The systems farthest behind, as a whole, are the urban expressways and the secondary highways. Many individual locations on other systems, of course, are inadequate and should be modernized as soon as possible.

ALTERNATIVE PROGRAMS

Should it be desired to eliminate the current backlog on all systems and catch up with traffic and service needs at a faster pace than one-twentieth each year for 20 years, then more funds would be required in early years, and less in later years. Unfortunately, this is the opposite of the gradually increasing income that governments can expect as population and traffic rise.

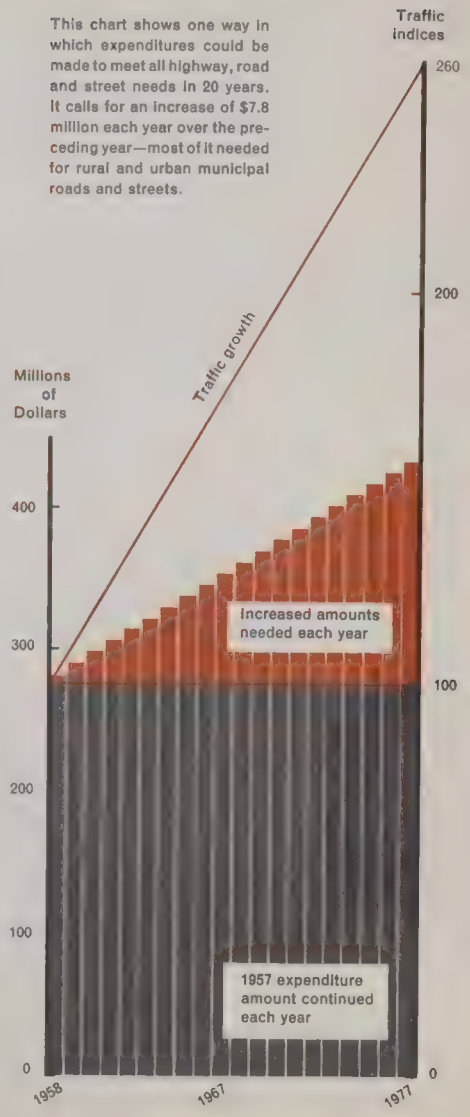
The economic growth of the Province, and the safety and convenience of its people, call for the earliest possible improvement of all highway, road and street systems, consistent with a sound financial position.

However, the rates of development may vary widely among different systems and different units of government. Such variable rates make possible a wide range of alternatives.

On rural Provincial highways, for example, if the 1957 expenditure amount were continued for 10

Province-wide needs

This chart shows one way in which expenditures could be made to meet all highway, road and street needs in 20 years. It calls for an increase of $7.8 million each year over the preceding year—most of it needed for rural and urban municipal roads and streets.



A major operation is the maintaining of roads in safe and adequate service condition after construction. This involves such diverse tasks as surface treating a county road or pavement marking a multi-lane highway.

years, the present backlog would be eliminated and accruing needs could be met as they develop.

To provide for a 10-year catch-up program for King's Highway urban extensions and expressways, the annual amounts spent on these facilities would have to be stepped up by about 57 percent above the requirements determined on a 20-year basis. For arterial streets, about a third more would be needed. For county roads, only about seven percent more would be required, since the backlog is relatively low and more work may be deferred to the second 10-year period. It is clear that acceleration is needed most on the King's Highway urban extensions and on expressways.

However, for the municipal systems as a whole, even the 20-year program would involve a considerable increase in present expenditures. Funds spent on municipal roads and streets in 1957 totalled about $109 million including Provincial subsidies. If that amount were continued for 20 years, it would provide only about 46 percent of the needs.

The study indicates, therefore, that it would be desirable to step up substantially the rate of improvement on municipal roads and streets. However, the amount of annual increases that may be feasible depends to a large extent on the ability of the individual municipalities themselves to finance the work, as well as on the ability of the Province to provide subsidies.

Pending more detailed fiscal studies, it is not possible to establish specific programs, other than for the Provincial highways under full control of the Province. Any fiscal changes that might be made should not be done at the expense of this primary Provincial responsibility.

In total, the magnitude of the problem has been portrayed, and its reasonableness has been established relative to future growth probabilities. Over a 20-year period, complete estimates of costs for all roads and streets are the equivalent of 1.2 cents per vehicle mile or $52 per capita per year, the latter about the same as in 1957. These values are well within the rates of expenditure experience in Ontario and elsewhere.

Acceleration of current programs in many locations and areas of the Province is vital to continued growth. How this can be done will depend on adoption of fiscal policies designed to overcome the backlog of needs at the earliest practicable date. In any event, approximately the same total amount—$7.2 billion—will be needed within 20 years, regardless of the rate of earlier acceleration of construction. Thus, goals have been established by which progress toward adequate highways, roads and streets can be measured.

POLICY CONSIDERATIONS

It has been shown that a comprehensive, conservative engineering analysis of highway, road and street needs has been carried out, and that findings are reasonable when tested against past practices in Ontario and estimates of similar problems made elsewhere.

Nevertheless, the tremendous figure of $7.2 billion needed over a 20-year period represents a substantial increase over present-day expenditures for highway purposes and poses fiscal problems for all responsible highway, road and street authorities.

The rapidly increasing highway needs suggest that major administrative and legislative consideration is required to determine how intergovernmental relations and responsibilities might be improved to reach the desired goals.

Finally, the task of planning the coordinated development of all road and street systems must be advanced to carry out the policies to be established in accordance with Ontario's continued growth.

FISCAL PROBLEMS

Fiscal problems naturally include questions concerning the sources of funds—that is, primarily the nature and amounts of taxes. To some extent, taxes may be related to the purposes for which they are spent. This report provides data about where, and for what purpose, funds should be spent for road and street needs; however, only the broadest inferences may be deduced relative to sources of funds. It is not the purpose of this report to offer financial solutions, but only to provide a basis whereby such problems can be further analyzed and policy determined. More specifically, the study provides data useful for guiding expenditures of funds made available from any source.

If, for example, the Province paid all costs of all roads and streets from the Provincial treasury, then specific rates of expenditure designed to achieve specific objectives within a given time could be decided upon and carried out, for example the improvement of one system could be advanced more rapidly than others. For almost two-thirds of the total needs, however, that is not the case—the nearly 1000 municipalities and the other responsible authorities individually make such decisions, and have provided an average of half the costs in the recent past.

SUBSIDIES

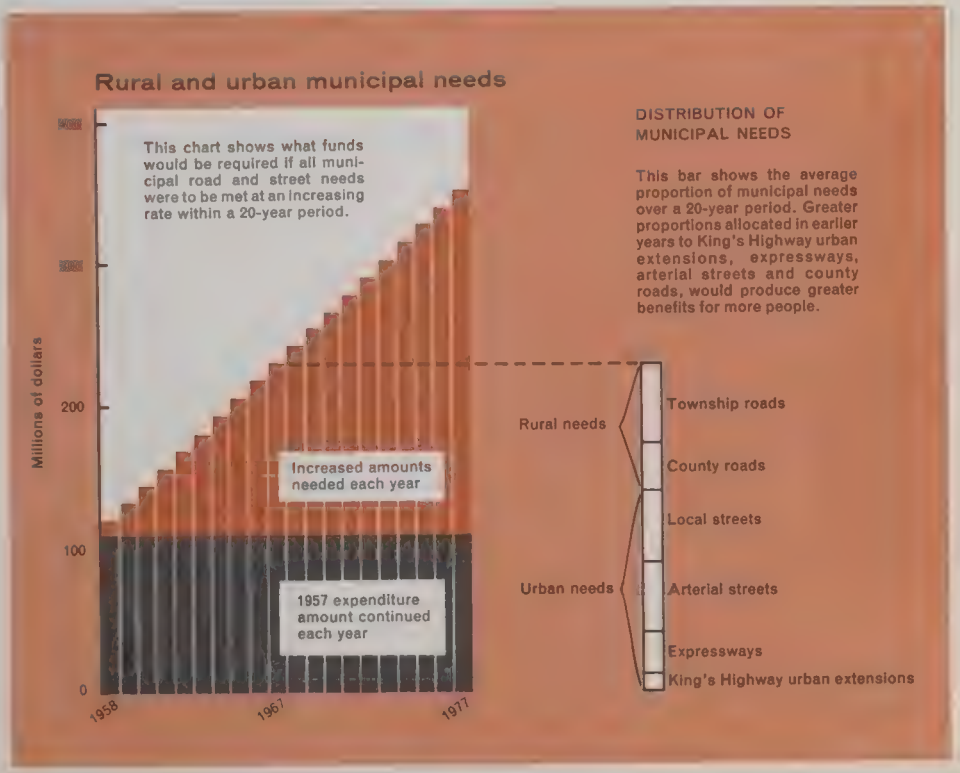
Chapter I included a brief description of subsidies by the Province to the municipalities. In 1957, some $51,500,000 was paid by the Province, and the total subsidized municipal road and street program was about $102,000,000. In addition, some $7,000,000 was spent by the Province for development roads under municipal jurisdictions, and in unorganized townships. Some minor additional expenditures were made by the Province in cities, towns and villages where connecting link or other special agreements were in force, and some municipalities spent more money than was subsidized.

The accompanying chart shows the extent of the problem facing the municipalities as a whole, if the estimated needs are to be met gradually within 20 years. The 1957 expenditures would have to be doubled by 1966, and the climb continued. Under present subsidy arrangements, that would involve increasing both municipal expenditures and Provincial subsidies at a similar rate.

Acceleration of capital improvements to meet the backlog needs sooner would, of course, require larger amounts, but the benefits naturally would be obtained earlier. Preceding chapters have pointed out that 79 percent of urban major street capital needs and 75 percent of county road capital needs over 20 years will actually be required within 10 years.

An accelerated program well might appear very difficult to achieve financially, if not physically. Moreover, it would depend heavily on the ability of the municipal governments to finance their share. Nevertheless, the needs are real and pressing, and the goals are established toward which all governments can work—measuring their rates of progress against these needed amounts. It should be recognized too, that well-constructed facilities will remain useful far beyond the selected financing period, and tax income will accrue at even faster rates in succeeding years. This would make possible re-payment of borrowed funds, if such were needed to accelerate improvements in the immediate future.

Variations in subsidy provisions complicate the overall picture. The 37 cities and separated towns, for example, receive a subsidy of one-third of their expenditures for street purposes. Their requirements are a substantial part of total urban needs. On the



present basis, their two-thirds share would involve greatly increased expenditures, and these would vary among the cities and towns.

The extent of bridge maintenance and construction in towns, villages and rural municipalities also affects the subsidy amounts, since 80 percent is provided by the Province, and a like amount is provided for road work in some townships. Estimates of 20-year program subsidy requirements under existing arrangements indicate that about 54 percent of all township road needs and 52 percent of all county road needs would be met by Provincial subsidy. The amounts naturally would vary widely for each municipality, depending on the ability of each one to provide the balance of needed funds.

An over-all study of subsidies is clearly indicated, not only by this evaluation of the needed programs, but also by past experience. The Department of Highways already has initiated such a study as a separate project. The findings will be correlated with those of the needs study in order to establish future policy.

Considerably more analysis of the ability of individual municipal governments to meet their road and street needs is required to determine whether present subsidy policies are proper. As a part of the over-all subsidy study, the rate of development of the several municipal road and street systems should be considered in light of the needs and benefits to be derived from accelerated programs of improvement. This might involve encouragement by the Province of faster development of those road and street systems of predominant interest and benefit to the Province as a whole.

PROVINCIAL HIGHWAYS (RURAL)

Present Provincial responsibilities for rural King's Highways and secondary highways can be met on a 10-year catch-up program basis within the framework of present expenditure policy. The 10-year program estimates needs at $148,976,000 annually —somewhat less than current expenditures which, however, include relatively small amounts for special agreements in urban areas and for development roads. Costs for both of these items are included with the respective municipal systems in this study.

The greater expenditures on King's Highways and secondary highways currently are desirable to overcome the heavy backlog of work and 10-year accruing capital needs, which together total 71 percent of 20-year needs. If continued for several years, current expenditures will provide a highway system that will more nearly meet the current needs of the expanding traffic. The improved ability of the Department of Highways to discharge its primary obligation suggests the importance of turning attention now to the greater relative needs of municipalities, for certainly several years will be required to develop necessary policies and detailed programs.

INTERGOVERNMENTAL RELATIONS

Effective relations between the Province and the municipalities on highway, road and street affairs might appear to depend mainly on fiscal matters. But the essential good relations also depend on general governmental policy, tax resources, extent of administrative responsibility, growth patterns, technical progress, tradition and other factors.

The great expansion of population and of motor vehicle use has resulted in wider markets and living areas, with expanding urban centres and the tremendous spread of suburban regions. These can be accompanied even by new governmental forms, as witness incorporation of the Municipality of Metropolitan Toronto. The development of northern areas has brought new responsibilities to the Province and the Department of Highways, while in older established regions, freedom to move long distances rapidly has emphasized the need for closely integrating all transportation routes.

These facts call for the closest possible cooperation among all agencies of government in dealing with roads and streets. History shows that, all too often, close relations are slow to develop and often lag behind needed improvements. This study now affords a new opportunity to examine both legislative and administrative policies in light of the facts it reveals.

Foremost is the fact of divided responsibility among governmental agencies in the administration and financing of motor vehicle transportation facilities. These are continuing, but responsibility is not co-equal; that is, administrative responsibility may lie almost completely with a municipality, but responsibility of financing is shared with the Province, and sometimes other governments, as in the case of suburban road commissions.

THE MUNICIPAL ROADS BRANCH

The chief agency of the Province in fiscal and other relations with the municipalities concerning road and street matters is the Municipal Roads Branch of the Department of Highways. Its district municipal engineers and other staff review current construction, proposed programs and budgets stemming from municipal by-laws. The Branch is the principal liaison between the municipalities and the Department of Highways, and helps develop the total Provincial budget for subsidies and their distribution.

In view of the great needs revealed by this study, the Department is planning to expand the Municipal Roads Branch to provide a higher level of professional service to municipalities than has been possible in the past. This would enable the Branch to help more specifically in the coordination of work among adjacent or over-lapping municipalities, and assist in integrating the Department planning with that of municipal governments.

It is anticipated that the Branch may be responsible for more detailed periodic review of municipal needs and that it will be in a better position to certify that Provincial funds are being used wisely and well. Finally, the Branch should encourage both the municipalities and the Province to step up their programs in the areas of greatest need.

In carrying out this vital work, the Municipal Roads Branch will need the understanding help and cooperation of all the municipalities and the specialist services available in the Department of Highways.

CITIES AND TOWNS

Urban places are focal points of traffic generation and attraction for the entire Province, as well as out-of-Province traffic. Containing three-fourths of Ontario's people, the cities, towns and villages should provide good transportation arteries for both internal circulation and for easy access to and from rural areas and other urban centres.

Such facilities can only be developed through co-ordination with nearby areas and with the Department of Highways. This study shows the great effects of city needs on King's Highways, and vice versa, as well as similar impacts on county and suburban roads.

The Department of Highways recognizes the growing inter-relations required and the need for providing specialists in urban traffic and design problems, particularly for the effective development of King's Highway urban extensions. This work might entail organizational changes through which concentrated attention would be given to cooperation with city and town officials. A desirable step would be for cities and towns, where possible, to appoint a single responsible official to represent the municipality in matters concerning the Department.

COUNTIES AND TOWNSHIPS

Traditionally, the counties and townships have worked together to improve rural road services. With increasing and more wide-spread use of passenger cars, trucks and buses, the technical problems and costs of providing adequate facilities are greater.

In Southern Ontario, where county road systems exist and engineers supervise work, it would appear highly desirable in certain cases to extend county engineering services to township road development and maintenance.

How this might be done is beyond the scope of this report. However, with needs approximating $58,000,000 annually over 20 years ahead, township roads deserve close attention. A way should be found to permit pooling of resources and technical services in the interest of providing better roads at less cost.

Extension of Provincial services and finances to county and township roads through "development road" methods involves close cooperation between the Province, counties and townships. Costs for such work are included in the county and township road estimates in this report since such roads remain under the jurisdiction of the respective municipalities. In a further study of ways and means of aiding county and township road improvement, it is hoped that the development roads can be incorporated into a

pre-planned and coordinated program.

An entirely different problem is posed in northern areas of the Province where there are no organized counties, and a number of unorganized townships exist. In these areas, secondary highways, financed by and under control of the Department of Highways, serve the same function as county roads in the south. To the extent possible, it is anticipated that Department services will be extended in an increasing degree to the local municipalities, through the Municipal Roads Branch.

PROVINCIAL-FEDERAL RELATIONS

Close cooperation between the Provincial and Federal governments, both financially and administratively, has accompanied the important move of the Dominion Government in the highway field in the selection, construction and improvement of the Trans-Canada Highway.

A new program to improve roads serving northern resource needs is just beginning. Costs for such work are not included in this study.

The future of such cooperative ventures is uncertain. Should a continuing relation develop, the Department of Highways will do its utmost to carry out the established policies and programs.

PLANNING

Planning for the development of highway, road and street systems of the future is a principal responsibility of all governmental organizations. Implied strongly in intergovernmental relations is the need for more coordinated planning by all agencies. More professional services and improved planning techniques are necessary.

CLASSIFICATION

Basic to all fiscal and engineering plans is the extent and nature of the road and street systems for which planning must be done. Development of properly classified road and street systems will permit the Province and the municipalities to coordinate their plans more closely, arrange financing on a sounder footing and promote logical improvement programs.

Existing systems and responsiblities have been described in general terms in Chapter I. In view of the growing needs, and as a part of the forward planning process, a re-examination is needed of the adequacy of the systems for modern transportation purposes.

In such a re-examination, the goal should be not only adequacy of the systems, but consistency of functions of the routes within each system. Moreover, the selected systems should be fixed or stabilized for a long period of time so planning can have a firm foundation. The report of the special committee of the Canadian Good Roads Association, recommending classes of roads and streets and methods for their selection, has played a part in this study, and it offers a basis for future planning of the several systems.

King's Highways—The 1956 report "A Plan for Ontario Highways" reviewed the system classification status and needs with respect to King's Highways. That report remains a good foundation on which to make decisions about which roads should be part of the King's Highway system.

The report proposed some additions to the system and indicated that a few routes are functioning more as county or secondary highways and might well be transferred to those systems, if a financial plan for the future would so provide. Since proposed revisions were minor in relation to the total situation, no changes were made. Consequently, this study is based entirely on the existing system plus routes needed for relief of present and future traffic congestion on the system.

Additions to the King's Highway System in the future should be examined carefully to see whether such proposals agree with criteria previously established for logical primary service in order to preserve a consistent Provincial network. It is not anticipated that many routes now a part of the system will be transferred in the near future, except possibly to the secondary highway system—also under full con-

This large and busy shopping centre illustrates the nature of rapid urban expansion which generates the need for more adequate arterial roadways.

Channelizing and signalizing heavily used intersections diminishes the number of conflicts between vehicles and promotes smoother and safer traffic flow. Qualified personnel trained to carry out such tasks are needed in larger urban and rural agencies.

trol of the Province. Should policy be established providing for appropriate financial means, such transfers might be arranged.

The problem of planning for King's Highway urban extensions is discussed later in the section "Urban Streets."

Secondary Highways—Secondary highways located generally in the north, have been analyzed and needs estimated on the basis of the existing locations so classified. It is possible that such routes are not consistently selected and that other roads provide similar service and should be added.

Studies will continue to determine need for additional routes. When completed, the studies might show the desirability of some revisions in the expenditure plans for the future.

Among such possible revisions would be a better plan for handling northern resource roads for which funds are now provided by other Departments of the Province. The Department of Highways, although directed to construct and maintain such facilities, has little control over the location and design of the roads. Often they do not fit into a long range highway plan for the various areas. If funds and the responsibility were given to the Department of Highways, upon request of other responsible authorities, more adequate results might be expected in the long run.

County and Township Roads—The selection, or classification, of roads now comprising the county road systems of the 37 counties has developed gradually over the years. Generally, the most important and heavily-travelled roads are now King's Highways, but the next most important and travelled roads have been designated as county roads.

Considerable attention in this study has been given to the nature, qualifications and consistency of selection of existing county roads within each county and among the several counties. The systems have been tested against criteria of importance, with consideration given to township roads that might also meet such tests equally as well as most existing county roads.

The County Engineers Advisory Committee and the study staff concluded that, on the whole, the present county road systems meet most tests satisfactorily. However, there are instances where better coordination is needed between counties, some township roads could qualify for county road status, and some county roads do not meet the criteria satisfactorily. More detailed study in cooperation with county and township officials is necessary to determine the full extent of such conditions.

This study suggests, therefore, that the Department of Highways continue the classification studies in cooperation with county engineers and other officials. If desirable changes in county road systems can be identified and agreed upon, and appropriate revisions are made accordingly in the finance plans, then county officials could, under present legislation, effect such revisions in the road systems.

Urban Streets—Currently there is little division of urban streets into classified systems of relative importance, except in Metropolitan Toronto. Some streets are marked as King's Highway routes, but seldom receive any special attention, except that which the municipalities themselves consider necessary. Smaller places, of course, have connecting link agreements of various kinds, and some streets have been assumed completely by the Province. Quite recently, special construction agreements have been made between the Province and a few large municipalities, including Ottawa, Hamilton, and Metropolitan Toronto.

In the latter case, Metro has also designated and assumed certain arterial streets of general interest to the community.

As mentioned in Chapter III, as a part of this study of needs it was necessary to identify, or classify, streets that provide area-wide transportation service, as distinguished from those which are principally of local interest to people who live along them. Consequently, with the advice and assistance of city engineers and other officials, the study has classified all streets in places of over 5,000 population, identifying King's Highway urban extensions, arterial streets, and the remaining business and residential streets.

This classification established the basic transportation plan from which traffic estimates and needs could be determined. Such a systematic approach is essential to all planning, and the designations should be established firmly for the future. The Department believes that it has an obligation to assist the urban places in the ultimate development of such plans which would be decided upon by the municipalities themselves.

However, the interests of the Province and the municipalities are mutual in relation to the best use of subsidies granted by the Province, especially in relation to King's Highway extensions through the urban areas. Accordingly, it is believed that future subsidy arrangements should be contingent on the development of mutually-agreed-upon classification plans, and that the combined total of King's Highway urban extensions and arterial streets be limited, for the present, to not more than one-third of all street mileage in each urban place. If subsidies were limited to that important mileage, it would serve to concentrate planning, and possibly general funds, on arteries of greatest importance to the municipalities and to the Province.

PHYSICAL PLANNING

Throughout this two-year study, it has been observed that uncertainties and inadequacies with regard to finances have hampered physical planning. Moreover, questions of jurisdictional responsibility sometimes stall needed work on all road and street systems.

Once an adequate and relatively stable set of systems of roads and streets is determined, detailed planning of improvements can proceed faster and with greater confidence.

More stability of systems, plus longer-range advance planning of finances, should encourage each road and street building authority to provide for adequate engineering staffs and to develop construction standards and methods for the growing traffic needs of the future.

The data accumulated for this needs study are basic sources of planning information. They should be kept reasonably up to date, improved and en-

Many townships adjacent to urban centres will experience widespread residential development during the next 20 years. This calls for coordination in the advance planning of all classes of roads and streets.

larged upon for better future planning for all facilities. Such facts are essential for engineering analyses by the Province and the municipalities, leading to conclusions that will produce facilities providing maximum service at least cost.

The projects that have been contemplated as needed in the different areas of the Province will have significant effects on the economic and social well-being of the communities involved. Therefore it is important that all relevant factors be included in the planning and designing of these facilities.

The Department of Highways has made, and will continue to make, regional planning studies that encompass large areas. Such studies become the initial foundation for major development plans, location of routes and their design. County, township, city planning and highway authorities, and different departments of the Provincial government often provide facts and assistance. Moreover, local agencies likewise develop similar plans for their own areas. As growth continues, need for such advance planning studies becomes increasingly apparent, and basic data are necessary for both Provincial and municipal authorities.

Coordination of effort is essential. The Department of Highways believes the fine beginning represented in the cooperation of the City and County Engineering Advisory Committees in this study should be continued for mutual benefits. The committees, together with the Department, can devise the best ways and means to collect facts and use them in the improvement of cooperative and coordinated planning in all areas, as well as to further other matters of common interest.

With the backlog of work now facing the Province and municipalities, and the certainty of needed future development, better pre-engineering and construction methods must be developed in all jurisdictions. To conserve funds and to get the most from existing facilities, especially in cities and towns, improved traffic engineering is needed also, so that motorists can operate as safely and speedily as possible.

In these, and other fields of effort, the Department is continually studying and applying the best techniques possible in the circumstances. Municipal engineers and planning officials do the same. Through the combined and coordinated efforts of all, the motorists' needs can be met.

CONCLUSIONS

The complete unity of Ontario's total road and street system is clear. No public road or street, however great or small, exists without a connection to all others—thus providing a continuous highway system for traffic that will multiply 2½ times in the next two decades. And thinking back to the growth that has taken place since 1938, will the year 1978 find us prepared?

The best estimates now available show that some $7 billion should be spent on the total highway, road and street system of the Province in the next 20 years—if prices remain at 1957 levels. But with the increased traffic and population, expected costs per mile of travel should be less than in the past decade, and about the same as spent per capita in 1957.

APPENDIX

DESIGN FEATURES	CONTROLLED ACCESS FREEWAYS & EXPRESSWAYS /1			ARTERIALS		
				DOWNTOWN AREA	INTERMEDIATE AREA	OUTLYING AREA
1977 DESIGN HOUR TRAFFIC VOLUME TOTAL FOR NO. OF LANES SHOWN	OVER 5400	UP TO 5400	KING'S HIGHWAYS BY-PASSES ONLY UNDER 750 /2	SEE BELOW		
SURFACE TYPE /3	A			A	A OR B /4	
NUMBER OF LANES	6 /5	4 /5	2 /5	CONTROLLED BY ANTICIPATED 1977 TRAFFIC VOLUMES AND OPERATING CONDITIONS. DETERMINE REQUIRED STREET WIDTH BY CONSULTING HOURLY CAPACITY TABLES /6		
SURFACE WIDTH	72'	48'	24'			
CURBS AND SIDEWALKS	NOT REQUIRED-PEDESTRIANS NOT PERMITTED SEPARATED PEDESTRIAN CROSSINGS TO BE PROVIDED WHERE NEEDED			YES	YES	AS REQUIRED
SHOULDER WIDTH	10'			——	——	8' (WHERE NEEDED)
MEDIAN WIDTH	8' MINIMUM /7		——	4' MEDIAN WHERE DESIGN HOUR TRAFFIC VOLUME EXCEEDS 750, IF FEASIBLE.		
PARKING	NOT PERMITTED EXCEPT ON FRONTAGE ROADS			WHERE VOLUMES ARE GREATER THAN PRESENT CAPACITY WITH PARKING, THEN PARKING SHOULD BE REMOVED. PARKING GENERALLY TO BE DISCOURAGED WITH PARALLEL PARKING PERMITTED ONLY DURING OFF-PEAK HOURS		
ILLUMINATION /8	CONTINUOUS	AT INTERSECTIONS		CONTINUOUS /9	AT INTERSECTIONS	
INTERSECTION TREATMENT — 10% OR MORE OF TRAFFIC ON INTERSECTING STREET	FULL ACCESS CONTROL	/10		TRAFFIC ACTUATED OR FIXED TIME SIGNALS WHERE WARRANTED STOP SIGN CONTROL FOR LOWER TRAFFIC VOLUMES		
INTERSECTION TREATMENT — LESS THAN 10% OF TRAFFIC ON INTERSECTING STREET		/11		TRAFFIC OR PEDESTRIAN ACTUATED SIGNALS WHERE WARRANTED OR STOP SIGN CONTROL		
STRUCTURES WIDTH	UNDER 100' LONG - FULL ROADWAY WIDTH. OVER 100' LONG - PAVEMENT WIDTH PLUS 6' PLUS MEDIAN /12			PAVEMENT PLUS SIDEWALKS		
VERTICAL CLEARANCE	15'			15'		
LOADING	H-20-S-16			H-20-S-16		
RAILWAY CROSSING SEPARATION	AT ALL RAILWAY CROSSINGS			MAIN LINE CROSSINGS ON STREETS CARRYING HEAVY TRAFFIC VOLUME WHERE PRACTICAL AND ECONOMICALLY FEASIBLE		
RAILWAY GRADE CROSSING PROTECTION	——			FLASHING SIGNALS AT ALL CROSSINGS WITHOUT WATCHMAN OR FLAGMAN AND WHERE AVERAGE DAILY TRAFFIC X NUMBER OF TRAINS = 3500 OR MORE /13		

/1 STANDARDS FOR CONTROLLED ACCESS ARTERIALS BASED ON 40 M.P.H. OPERATING SPEED. ACCESS PERMITTED ONLY AT INTERCHANGES AND INTERSECTIONS WITH OTHER ARTERIALS. ACCESS FROM ABUTTING PROPERTY BY FRONTAGE STREETS WHERE REQUIRED.
/2 APPLIES SPECIFICALLY TO NEW LOCATIONS OF 2-LANE KING'S HIGHWAY ROUTES BY-PASSING BUSINESS AREAS OF MUNICIPALITIES.
/3 CHARACTER AND AMOUNT OF TRAFFIC SHOULD DETERMINE THE TYPE OF SURFACE REQUIRED
/4 FOR CENTRES OF UNDER 5000 POPULATION SURFACE TYPE IN INTERMEDIATE AND OUTLYING AREA MAY BE A, B OR C.
/5 12 FOOT TRAFFIC LANES
/6 STREET WIDTH CHOSEN SHOULD BE DIVISIBLE INTO EVEN NUMBERS OF 11' OR 12' LANES, EXCEPT WHERE ONE-WAY OPERATION IS PLANNED.
/7 PLUS 2' CLEARANCE TO EDGE OF PAVEMENT EACH SIDE.
/8 ALL ILLUMINATION TO BE ACCORDING TO CANADIAN STANDARDS ASSOCIATION PRACTICE.
/9 FOR CENTRES OF UNDER 5000 POPULATION ILLUMINATION NEED BE CONTINUOUS IN DOWNTOWN AREA ONLY.
/10 GRADE SEPARATION WHERE WARRANTED AND FEASIBLE, OTHERWISE CHANNELIZED OR SIGNALIZED INTERSECTION AT GRADE.
/11 CHANNELIZED AND SIGNALIZED INTERSECTION AT GRADE.
/12 INCLUDES SHOULDERS OF APPROACHES.
/13 DOUBLE TRACK OR MORE SHOULD ALSO HAVE SHORT ARM GATES.

STUDY

DESIGN STANDARDS

FOR

COUNTY ROADS

CLASS		A	B	C	D	E	F	G	AA
DAILY TRAFFIC (Design Year)		7500+	3000-7500	1000-3000	400-1000	200-400	100-200	0-100	URBAN CONDITIONS SEE SUPPLEMENTARY INSTRUCTIONS
ROADWAYS									
DESIGN SPEED (M.P.H.)		70	70	60	50	50	45	45	
HORIZONTAL CURVATURE (Deg.)		3	3	4.5	6	6	10*	10*	
STOPPING SIGHT DISTANCE (Feet)		600	600	475	350	350	325	325	
GRADIENT (Per Cent)		3	3	5	6	6	8*	10*	
SURFACE WIDTH (Feet)		2@24	24	22	22	20	20	18	
SHOULDER WIDTH (Feet)		8+2 For Rounding	8+2 For Rounding	8+2 For Rounding	8	8	4	4	
RIGHT OF WAY WIDTH (Feet)		120+	120	100	66	66	66	66	
SURFACE TYPE		HOT MIX		LOW OR INTERMEDIATE BITUMINOUS			GRAVEL OR STONE		
STRUCTURES									
HANDRAIL TO HANDRAIL WIDTH (Feet) °	Under 100 Ft	or 2@34 1@70	34	34	34	28	28	24	
	Over 100 Ft	or 2@28 1@64	28	28	28	28	28	24	
LOADING		H 20 — S 16							
VERTICAL CLEARANCE		18'							

NOTE: *EXCEPT WHERE ROCK CUTS BE EXCESSIVE. °ADD 2' FOR EACH SIDEWALK, IF NEEDED.

STUDY

DESIGN STANDARDS

FOR

TOWNSHIP ROADS

CLASS	H	G	F	E
DAILY TRAFFIC (Design Year)	0-50	50-100	100-200	200-400
ROADWAYS				
DESIGN SPEED (M.P.H.)	40	45	45	50
HORIZONTAL CURVATURE (Deg.) *	15	10	10	6
STOPPING SIGHT DISTANCE (Feet)	275	325	325	350
GRADIENT (Per Cent) *	12*	10*	8*	8*
SURFACE WIDTH (Feet)	18	18	20	20
SHOULDER WIDTH (Feet)	4	4	4	6
RIGHT OF WAY WIDTH (Feet)	66	66	66	66
SURFACE TYPE	gravel or stone			low cost bituminous
STRUCTURES				
HANDRAIL TO HANDRAIL WIDTH (Feet) **	24	24	28	28
LOADING	H20-S16			
VERTICAL CLEARANCE	15'			

NOTE: * EXCEPT WHERE ROCK CUTS WOULD BE EXCESSIVE. ** ADD 2' FOR EACH SIDEWALK, IF NEEDED.

CLASSIFICATION			FREEWAYS (a) & MAJOR TRUNKLINES		OTHER KING'S HIGHWAYS (b)							
TYPE			MULTI LANE (c) (Divided)	2 LANE	MULTI LANE (c) (divided)	TWO LANE						
CLASS NUMBER			I	II	3	4	5	6	7	8	9	10
ESTIMATED 20 YEAR A.A.D.T.						3000-5000 (d)	2000 — 3000		1000 — 2000		Under 1000	
TERRAIN			ALL	ALL	ALL	ALL	Flat	Rolling	Flat	Rolling	Flat	Rolling
DESIGN SPEED - (m.p.h.)			70	70	70	70	70	60	60	50	50	50
OPERATING SPEED (m.p.h.)			50-55	50-55	45-50	45-50	45-50	45-50	45-50	40-45	40-45	40-45
DESIGN CAPACITY Vehicles Per Hr. (e)	Percent 1500' Sight Distance Available Per mile	100 % 80 % 60 %	1000 per lane With access control 600 per lane Without access control	600 v.p.h. 550 500	1200 per lane with Access control 700 per lane without Access control	900 v.p.h 800 690	900 v.p.h. 800 690		Not Applicable		Not Applicable	
CURVATURE — Maximum Degree			3	3	3	3	3	4.5	4.5	7	7	7
STOPPING SIGHT DISTANCE - Feet			600	600	600	600	600	475	475	350	350	350
GRADIENT - Maximum Percent			3(f)	(g)	3(f)	(g)	(g)	(g)	4(h)	7(h)	4(j)	7(j)
LANE WIDTH — Feet			12	12	12	12	12	11	11	11	11	11
SHOULDER WIDTH — Feet (k)			10	10	10	10	8	8	8	6	6	6
RIGHT OF WAY WIDTH — Feet (n)			300	120	200	120	120	120	100	100	100	100
SURFACE TYPE (m)			5½ inch asphaltic concrete		4½ inch asphaltic concrete		3½ inch asphaltic concrete					
STRUCTURES	CLEAR WIDTH		p	q,r	p	q,r	q,s	q,t	q,u	q,u	q,u	q,u
	LOADING		H 20 — S 16									
	VERTICAL CLEARANCE		15 Feet									

NOTE: 1 Certain design features such as curvature, gradient, and sight distance to be better than standard if possible at no extra cost.
2 In urban-like congested areas outside incorporated limits, or in rural-like sections inside incorporated places, design and operating speeds may be reduced 10 m.p.h., with appropriate curvature and sight distance. This does not apply to Freeway design.

a. All Freeways to have complete control of access New locations of Major Trunklines to have maximum practical partial control of access.
b. Minor Trunklines to have Design Speed of not less than 60 m.p.h.
c. Median Strip is required, - width at least 60 feet except in special cases.
d. For volumes in this range, capacity studies may indicate need for four lanes.
e Equivalent passenger vehicles — Total traffic ways for two lanes. For multi lanes per lane capacity in the direction of heavier flow.
f May be increased to 6% in special cases.
g. 3% maximum for standard capacity Over 3% to 7% grades require special capacity analysis for climbing lanes, 7% maximum any location.
h. Less 1% for grades more than 1000'. Add 1% for grades less than 500'.
j. Add 1% for grades less than 750'.
k. Distance from edge of pavement to inner edge of rounding.
m. Granular bases will be designed in accordance with anticipated loads and soil conditions.
n. To be 150 feet throughout for two lane roads in northern Ontario.
p. i) Widths herein apply only to 4-lane divided without speed-change lanes or sidewalk.
ii) Span 100 ft. or less — single structure, two roadways 34 ft curb-to-curb with 20 ft median; twin structures, 37 ft. curb-to-curb on each.
iii) Span over 100 ft — single structure, two roadways 27 ft. curb-to-curb with 10 ft median; twin structures, 30 ft. curb-to-curb on each.
iv) Underpass — 34 ft abutment-to-median-curb; single opening to have 20 ft median; double opening to have median wider than pier by 6 ft. each side.
q. Widths shown below provide for only 2 traffic lanes.
r. i) Span 100 ft or less — curb-to-curb 44 ft. if no sidewalk, 41 ft. if one sidewalk, 38 ft. if two sidewalks.
ii) Span over 100 ft. — 30 ft. curb-to-curb, with or without sidewalk(s).
iii) Underpass — 44 ft. abutment-to-abutment.
s. Same as r. except 40 ft., 37 ft., 34 ft. respectively for span 100 ft. or less.
t. Same as r. except 38 ft., 35 ft., 32 ft respectively for span 100 ft. or less.
u. i) Span 100 ft or less — curb-to-curb 34 ft. if no sidewalk, 31 ft. if one sidewalk, 28 ft. if two sidewalks.
ii) Span over 100 ft. — 28 ft. curb-to-curb, with or without sidewalk(s).
iii) Underpass — 34 ft. abutment-to-abutment.

URBAN STREET WORK SHEET

DESIGN STANDARDS FOR SECONDARY HIGHWAYS (a)

Planning and Design Branch
Department of Highways of Ontario

CLASS NUMBER		AS FOR KING'S HIGHWAY	11	12	13
ESTIMATED 1966 A.D.T		OVER 1000	400 - 1000	150 - 400	UNDER 150
DESIGN SPEED	m.p.h		50	45	40
CURVATURE	maximum degree		7	9	11
STOPPING SIGHT DISTANCE	feet		350	325	275
GRADIENT	maximum percent		7	8	10
SURFACE WIDTH	feet	AS FOR KING'S HIGHWAY	22	20	18
SHOULDER WIDTH	feet		6	4	4
RIGHT-OF-WAY WIDTH	feet		100	86(b)	66(b)
SURFACE TYPE			MULCH	PRIME WITH DOUBLE SEAL	GRAVEL(c)
STRUCTURES	CLEAR WIDTH		28 feet		
	VERTICAL CLEARANCE		15 feet		
	LOADING		H20 S16		

NOTES

(a) Certain design features such as curvature, gradient, sight distance, to be better than standard, if possible at no extra cost.
(b) 100 feet in Northern Ontario.
(c) Gravel well-graded and stabilized

IDENTIFICATION

1. City / Town
2. Population
3. Street
4. Project No
5. From
   To
6. Length (To Nearest /10 Mile)

CODE BLOCK (Do not write in this Block) — CARD CONTROL 0 1

CLASSIFICATION (STUDY STATUS) AND EXISTING PAVEMENT TYPE

7. CHECK ONE OF THE FOLLOWING
   - King's Highway Urban Extension
   - Arterial Street
   - Business or Industrial Access Street

8. CHECK ONE OF THE FOLLOWING
   - Type A Pavement
   - " B "
   - " C "
   - " D "
   - No Road Existing

TRAFFIC DATA

9. 1957 D.H.V
10. 1957 A.A.D.T
11. Growth Factor
12. 1977 D.H.V
13. Practical Capacity (EXISTING CONDITIONS)
14. Practical Capacity (AFTER TR CONTROL DESCRIBED BELOW)
15. Vol. / Cap 1957
16. Year Vol. / Cap. Exceeds 1.25

BASIC PROBLEMS (DESCRIBE)

SOLUTION (DESCRIBE)

CHARACTER OF WORK

	NOW	1-5 YRS.	6-10 YRS.	11-15 YRS.	16-20 YRS.
17. Resurface					
18. Widen					
19. Reconstruct					
20. New Street					
21. Expressway					
22. New External By-Pass					
23. FUTURE PAVEMENT TYPE (CHECK ONE)		A	B		
24. Structures ____ Sq. Feet					
25. Traffic Control & Illumination					

COST ESTIMATE 1)

	NOW	1-5 YRS	6-10 YRS	11-15 YRS	16-20 YRS
26. Right-of-Way	$	$	$	$	$
27. Grading, Drainage And Miscellaneous 2)					
28. Storm Sewer					
29. Base and Surface					
30. Sidewalks					
SUBTOTALS	31. $	32. $	33. $	34. $	35. $
36. Structures					
37. Traffic Control and Illumination					
38. TOTAL COST	$	$	$	$	$

1) ENTER COSTS IN THOUSANDS OF DOLLARS
2) INCLUDES LATERALS, CURB AND GUTTER, AND RELOCATING UTILITIES

PREPARED BY _____ DATE _____ REVIEWED BY _____ DATE _____ CODED BY _____ DATE _____

WRITE ANY REMARKS ON THE BACK OF THIS SHEET

COUNTY ROAD AND BRIDGE WORK SHEETS

FORM PL-MR-1

COUNTY ROAD WORK SHEET

STATISTICS AND ECONOMICS SECTION — DEPARTMENT OF HIGHWAYS — ONTARIO — CARD CONTROL [7]

A. IDENTIFICATION

CODE BLOCK

1 COUNTY OF _____ (SUB COMM _____) — 2 ROAD NO _____ — 3 SECTION NO _____
4 FROM _____ TO _____
5 LENGTH _____ — 6 BUILT UP ☐ RURAL ☐

B. TRAFFIC DATA

7 1967 A.D.T _____ — 8 1977 EST A.D.T _____

C. ROAD DATA

9 TERRAIN FLAT ☐ ROLLING ☐ ROCKY ☐ — POINT RATING (10) _____
10 ALIGNMENT (10) _____ — SAFE SPEED _____
11 GRADES (10) _____
12 SURFACE WIDTH (10) _____ FEET
13 SURFACE COND (10) _____ TYPE
14 SHOULDER WIDTH (10) _____ FEET
15 BASE
EST. DEPT. _____ IN (15) _____
16 DRAINAGE (10)
17 EST SURFACE LIFE (10) _____ YEARS
18 MAINTENANCE DEMAND (10) _____
(SURFACE SHOULDERS DRAINAGE WINTER CONTROL)
19 TOTAL POINT SCORE
20 RIGHT-OF-WAY WIDTH _____ FEET
21 CHARACTER OF DEFICIENCIES (DESCRIBE)

D. PROPOSED IMPROVEMENT

22 TYPE
RESURFACING AND MINOR WIDENING ☐
RECONSTRUCTION ☐
BASE AND SURFACE ☐
NEW CONSTRUCTION (RELOCATION) ☐
23 DESIGN YEAR A.D.T _____
24 SURFACE TYPE _____
25 DESIGN CLASS _____
26 LENGTH _____ MILES

E. COST AND TIME OF IMPROVEMENT

	NOW	1 - 5	6 - 10	11 - 15	16 - 20
27 RIGHT-OF-WAY					
28 GRADING AND DRAINAGE					
29 BASE AND SURFACE					
30 CULVERTS					
31 TOTAL ROAD COST					
32 ROAD COST PER MILE $ _____					
33 ADD STRUCTURES FROM PL MR-2					
34 ADD RWY XING PROT FROM PL MR-3					
35 ADD SUPPLEMENTARY WORK OF _____					
36 TOTAL SECTION COSTS					

REMARKS _____

DATE _____ 1967 — BY _____

F. CLASSIFICATION

37 EXISTING STATUS
KING'S HWY _____
SECONDARY HWY _____
SUBURBAN ROAD _____
COUNTY ROAD _____
TWP ROAD _____

(FOR HEAD OFFICE USE ONLY)
38 STUDY STATUS

CODE BLOCK
1 ☐ 2 - 3
2 ☐ 4 - 6
3 ☐ 7 - 8
5 ☐ 9 - 11
7 ☐ 12 - 14
9 ☐ 15
10 ☐ 16
11 ☐ 17
12 ☐ 18 - 20
13 ☐ 21 - 23
14 ☐ 24
15 ☐ 25 - 26
16 ☐ 27
17 ☐ 28 - 29
18 ☐ 30
19 ☐ 31 - 32
20 ☐ 33 - 35
22 ☐ 36
24 ☐ 37
25 ☐ 38
26 ☐ 39 - 41
27 ☐ 42 - 45
28 ☐ 46 - 49
29 ☐ 50 - 53
30 ☐ 54 - 57
31 ☐ 58 - 61
32 ☐ 62 - 63
35 ☐ 64 - 67
36 ☐ 68 - 72
37 ☐ 73
38 ☐ 74

FORM PL-MR-7

COUNTY BRIDGE WORK SHEET

STATISTICS AND ECONOMICS SECTION — DEPARTMENT OF HIGHWAYS — ONTARIO — CARD CONTROL [8]

A IDENTIFICATION

LOCAL NAME _____
1 COUNTY OF (SUBURBAN COMM) _____ — 2 BRIDGE NO ☐ _____
3 ON COUNTY ROAD NO. _____ SECT NO _____ OR — 4 NOT ON COUNTY ROAD ☐
5 LOT _____ CON _____ TWP OF _____
6 LAND USE — BUILT UP ☐ RURAL ☐

B. TRAFFIC DATA

7 1967 A D T _____

C. TYPE OF CROSSING

8 STREAM CROSSING ☐ — RAILWAY UNDER ROAD ☐ — GRADE SEPARATION ☐ — RAILWAY OVER ROAD ☐

D BRIDGE DATA

9 APPROACHES — WIDTH — GRADE
N OR E SIDE _____ FT _____ UP/DN
E OR W SIDE _____ FT _____ UP DN
13 SIDEWALKS — NONE ☐ N. ☐ S. ☐ E. ☐ W ☐
10 BRIDGE ROADWAY WIDTH _____ FEET
MEETS DESIGN STANDARDS ☐
MEETS TOLERABLE STANDARDS ☐
BELOW TOLERABLE CONDITIONS ☐
14 NO. SPANS
15 SAFE LOADING _____ TONS
MEETS DESIGN STANDARDS ☐
MEETS TOLERABLE STANDARDS ☐
BELOW TOLERABLE CONDITIONS ☐
11 YEAR BUILT
12 ESTIMATED LIFE _____ YEARS
16 SKEW
17 CLEAR SPAN _____ FEET
18 MATERIAL OF STRUCTURE — SUBSTRUCTURE — SUPERSTRUCTURE — DECK
WOOD
STONE
STEEL
CONCRETE
19 TYPE OF STRUCTURE

E CHARACTER OF DEFICIENCIES (DESCRIBE)

F. PROPOSED IMPROVEMENT

20 TYPE OF WORK
RECONDITION EXISTING STRUCTURE ☐
REPLACE SAME LOCATION ☐
REPLACE NEW LOCATION ☐
NEW STRUCTURE ☐
21 CONSTRUCTION YEAR
27 DESIGN YEAR A D T _____
DESIGN DATA
22 TYPE OF STRUCTURE _____
23 SPAN _____ FEET
24 SKEW
25 ROADWAY WIDTH _____ FEET
26 LOADING

G. COST ESTIMATE

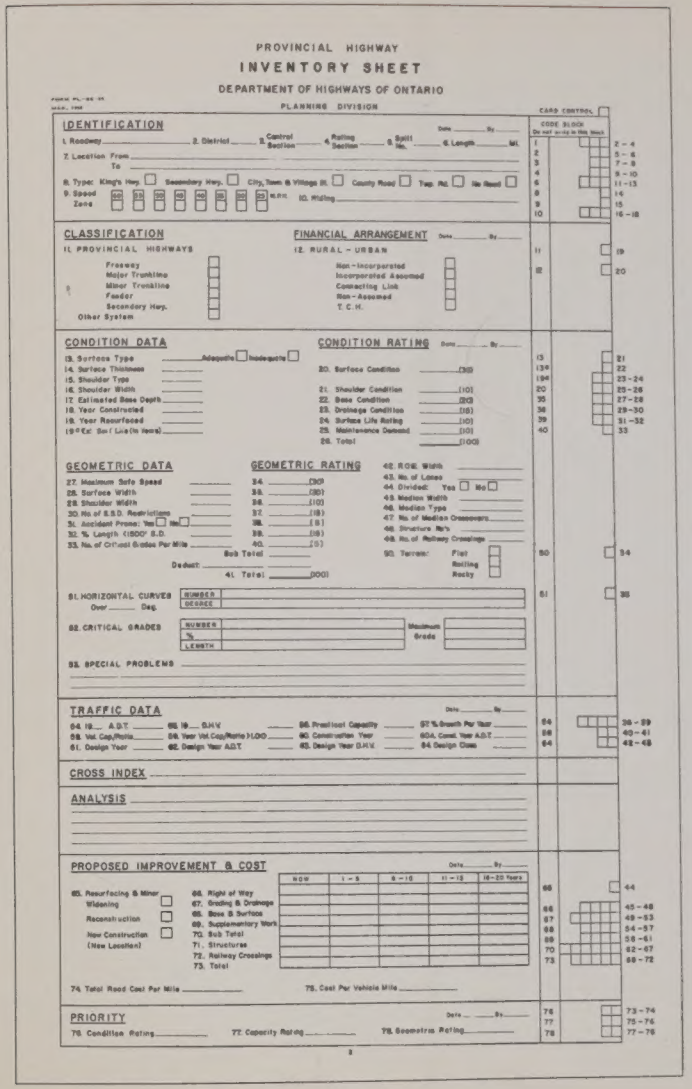
28 DECK WIDTH (INC SIDEWALKS) _____ FT
29 LENGTH OF DECK _____ FEET
30 AREA OF DECK _____ SQ FT
31 EST COST/SQ FT $ _____ = $ _____ PER SQ FT
32 TIME OF IMPROVEMENT — NOW ☐ — 1 - 5 ☐ — 6 - 10 ☐ — 11 - 15 ☐ — 16 - 20 ☐
DATE _____ 1967 — BY _____

H. CLASSIFICATION

FOR HEAD OFFICE USE ONLY
33 EXISTING STATUS — 34 STUDY STATUS
KING'S HIGHWAY BRIDGE
SECONDARY HIGHWAY BRIDGE
SUBURBAN BRIDGE
COUNTY BRIDGE ON COUNTY RD
CITY BRIDGE NOT ON COUNTY RD
TOWNSHIP BRIDGE

CODE BLOCK
1 ☐ 2 - 3
2 ☐ 4 - 5
3 ☐ 6 - 8
4 ☐ 9
6 ☐ 10
8 ☐ 11
10 ☐ 12 - 14
12 ☐ 15 - 16
15 ☐ 17 - 19
17 ☐ 20 - 22
19 ☐ 23 - 24
20 ☐ 25
21 ☐ 26 - 27
22 ☐ 28 - 29
23 ☐ 30 - 32
25 ☐ 33 - 34
31 ☐ 35 - 37
32 ☐ 38
33 ☐ 39
34 ☐ 40

PROVINCIAL HIGHWAY INVENTORY SHEET



PROVINCIAL HIGHWAY

INVENTORY SHEET

DEPARTMENT OF HIGHWAYS OF ONTARIO

PLANNING DIVISION

CARD CONTROL

IDENTIFICATION

CLASSIFICATION

FINANCIAL ARRANGEMENT

CONDITION DATA

CONDITION RATING

GEOMETRIC DATA

GEOMETRIC RATING

TRAFFIC DATA

CROSS INDEX

ANALYSIS

PROPOSED IMPROVEMENT & COST

PRIORITY

URBAN STREETS

20-year capital construction costs

IN THOUSANDS OF DOLLARS

Population Group	No. of Municipalities	Major Streets Roadway	Major Streets Structures	Major Streets Sub Total	Local Streets	Total	Cost/Capita ($)
Metropolitan Toronto	13	$532,258	$205,039	$ 737,297	$253,817	$ 991,114	730
Over 100,000	4	145,245	94,085	239,330	148,195	387,525	570
25—100,000	15	125,506	32,696	158,202	169,857	328,059	510
10—25,000	24	56,285	20,559	76,844	60,748	137,592	350
5—10,000	34	54,960	18,636	73,596	49,466	123,062	500
Under 5,000	255	49,385	12,780	62,165	72,580	134,745	300
Total	345	$963,639	$383,795	$1,347,434	$754,663	$2,102,097	560

COUNTY ROADS

20-year capital construction costs

IN THOUSANDS OF DOLLARS

County		County	
Brant	$ 4,561	Norfolk	$ 10,624
Bruce	9,134	Northumberland & Durham	8,657
Carleton	7,437	Ontario	12,708
Dufferin	4,279	Oxford	9,973
Elgin	11,821	Peel	8,875
Essex	17,169	Perth	5,164
Frontenac	6,402	Peterborough	5,979
Grey	8,701	Prescott & Russell	9,200
Haldimand	3,471	Prince Edward	3,909
Halton	9,600	Renfrew	5,241
Hastings	9,563	Simcoe	9,167
Huron	15,911	Stormont, Dundas & Glengarry	12,422
Kent	16,318	Victoria	7,436
Lambton	8,978	Waterloo	5,646
Lanark	8,531	Welland	9,586
Leeds & Grenville	11,542	Wellington	14,539
Lennox & Addington	4,893	Wentworth	16,863
Lincoln	8,952	York	13,290
Middlesex	22,273	*Total*	$358,815